MSC2010: Final Public Version [Dec. 2009]

MSC2010

This document is a printed form the Final Public Version of MSC2010 produced jointly by the editorial staffs of Mathematical Reviews (MR) and Zentralblatt für Mathematik (Zbl) in consultation with the mathematical community. The goals of this revision of the Mathematics Subject Classification (MSC) were set out in the announcement of it and call for comments by the Executive Editor of MR and the Chief Editor of Zbl in August 2006. This document results from the MSC revision process that has been going on since then. MSC2010 will be fully deployed from July 2010.

The editors of MR and Zbl deploying this revision therefore ask for feedback on remaining errors to help in this work, which should be given, preferably, on the Web site at `http://msc2010.org` or, if the internet is not available, through e-mail to `feedback@msc2010.org`. They are grateful for the many suggestions that were received previously which have much influenced what we have.

How to use the Mathematics Subject Classification [MSC]

The main purpose of the classification of items in the mathematical literature using the Mathematics Subject Classification scheme is to help users find the items of present or potential interest to them as readily as possible—in products derived from the Mathematical Reviews Database (MRDB), in Zentralblatt MATH (ZMATH), or anywhere else where this classification scheme is used. An item in the mathematical literature should be classified so as to attract the attention of all those possibly interested in it. The item may be something which falls squarely within one clear area of the MSC, or it may involve several areas. Ideally, the MSC codes attached to an item should represent the subjects to which the item contains a contribution. The classification should serve both those closely concerned with specific subject areas, and those familiar enough with subjects to apply their results and methods elsewhere, inside or outside of mathematics. It will be extremely useful for both users and classifiers to familiarize themselves with the entire classification system and thus to become aware of all the classifications of possible interest to them.

Every item in the MRDB or ZMATH receives precisely one *primary* classification, which is simply the MSC code that describes its principal contribution. When an item contains several principal contributions to different areas, the primary classification should cover the most important among them. A paper or book may be assigned one or several secondary classification numbers to cover any remaining principal contributions, ancillary results, motivation or origin of the matters discussed, intended or potential field of application, or other significant aspects worthy of notice.

The principal contribution is meant to be the one including the most important part of the work actually done in the item. For example, a paper whose main overall content is the solution of a problem in graph theory, which arose in computer science and whose solution is (perhaps) at present only of interest to computer scientists, would have a primary classification in 05C (Graph Theory) with one or more secondary classifications in 68 (Computer Science); conversely, a paper whose overall content lies mainly in computer science should receive a primary classification in 68, even if it makes heavy use of graph theory and proves several new graph-theoretic results along the way.

There are two types of cross-references given at the end of many of the entries in the MSC. The first type is in braces: "{For A, see X}"; if this appears in section Y, it means that contributions described by A should usually be assigned the classification code X, not Y. The other type of cross-reference merely points out related classifications; it is in brackets: "[See also ...]", "[See mainly ...]", etc., and the classification codes listed in the brackets may, but need not, be included in the classification codes of a paper, or they may be used in place of the classification where the cross-reference is given. The classifier must judge which classification is the most appropriate for the paper at hand.

`00-XX` **GENERAL**
- `00-01` Instructional exposition (textbooks, tutorial papers, etc.)
- `00-02` Research exposition (monographs, survey articles)
- `00Axx` **General and miscellaneous specific topics**
- `00A05` General mathematics
- `00A06` Mathematics for nonmathematicians (engineering, social sciences, etc.)
- `00A07` Problem books
- `00A08` Recreational mathematics [See also 97A20]
- `00A09` Popularization of mathematics
- `00A15` Bibliographies
- `00A17` External book reviews
- `00A20` Dictionaries and other general reference works
- `00A22` Formularies
- `00A30` Philosophy of mathematics [See also 03A05]
- `00A35` Methodology of mathematics, didactics [See also 97Cxx, 97Dxx]
- `00A65` Mathematics and music
- `00A66` Mathematics and visual arts, visualization
- `00A67` Mathematics and architecture
- `00A69` General applied mathematics {For physics, see 00A79 and Sections 70 through 86}
- `00A71` Theory of mathematical modeling
- `00A72` General methods of simulation
- `00A73` Dimensional analysis
- `00A79` Physics (use more specific entries from Sections 70 through 86 when possible)
- `00A99` Miscellaneous topics
- `00Bxx` **Conference proceedings and collections of papers**
- `00B05` Collections of abstracts of lectures
- `00B10` Collections of articles of general interest
- `00B15` Collections of articles of miscellaneous specific content
- `00B20` Proceedings of conferences of general interest
- `00B25` Proceedings of conferences of miscellaneous specific interest
- `00B30` Festschriften
- `00B50` Volumes of selected translations
- `00B55` Miscellaneous volumes of translations
- `00B60` Collections of reprinted articles [See also 01A75]
- `00B99` None of the above, but in this section

`01-XX` **HISTORY AND BIOGRAPHY [See also the classification number–03 in the other sections]**
- `01-00` General reference works (handbooks, dictionaries, bibliographies, etc.)
- `01-01` Instructional exposition (textbooks, tutorial papers, etc.)
- `01-02` Research exposition (monographs, survey articles)
- `01-06` Proceedings, conferences, collections, etc.
- `01-08` Computational methods
- `01Axx` **History of mathematics and mathematicians**
- `01A05` General histories, source books
- `01A07` Ethnomathematics, general
- `01A10` Paleolithic, Neolithic
- `01A12` Indigenous cultures of the Americas
- `01A13` Other indigenous cultures (non-European)
- `01A15` Indigenous European cultures (pre-Greek, etc.)
- `01A16` Egyptian
- `01A17` Babylonian
- `01A20` Greek, Roman
- `01A25` China
- `01A27` Japan
- `01A29` Southeast Asia
- `01A30` Islam (Medieval)
- `01A32` India
- `01A35` Medieval
- `01A40` 15th and 16th centuries, Renaissance
- `01A45` 17th century
- `01A50` 18th century
- `01A55` 19th century
- `01A60` 20th century
- `01A61` Twenty-first century
- `01A65` Contemporary
- `01A67` Future prospectives
- `01A70` Biographies, obituaries, personalia, bibliographies
- `01A72` Schools of mathematics
- `01A73` Universities
- `01A74` Other institutions and academies
- `01A75` Collected or selected works; reprintings or translations of classics [See also 00B60]
- `01A80` Sociology (and profession) of mathematics
- `01A85` Historiography
- `01A90` Bibliographic studies
- `01A99` Miscellaneous topics

`03-XX` **MATHEMATICAL LOGIC AND FOUNDATIONS**
- `03-00` General reference works (handbooks, dictionaries, bibliographies, etc.)
- `03-01` Instructional exposition (textbooks, tutorial papers, etc.)
- `03-02` Research exposition (monographs, survey articles)
- `03-03` Historical (must also be assigned at least one classification number from Section 01)

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03-04 Explicit machine computation and programs (not the theory of computation or programming)
03-06 Proceedings, conferences, collections, etc.
03Axx **Philosophical aspects of logic and foundations**
03A05 Philosophical and critical {For philosophy of mathematics, see also 00A30}
03A10 Logic in the philosophy of science
03A99 None of the above, but in this section
03Bxx **General logic**
03B05 Classical propositional logic
03B10 Classical first-order logic
03B15 Higher-order logic and type theory
03B20 Subsystems of classical logic (including intuitionistic logic)
03B22 Abstract deductive systems
03B25 Decidability of theories and sets of sentences [See also 11U05, 12L05, 20F10]
03B30 Foundations of classical theories (including reverse mathematics) [See also 03F35]
03B35 Mechanization of proofs and logical operations [See also 68T15]
03B40 Combinatory logic and lambda-calculus [See also 68N18]
03B42 Logics of knowledge and belief (including belief change)
03B44 Temporal logic
03B45 Modal logic (including the logic of norms) {For knowledge and belief, see 03B42; for temporal logic, see 03B44; for provability logic, see also 03F45}
03B47 Substructural logics (including relevance, entailment, linear logic, Lambek calculus, BCK and BCI logics) {For proof-theoretic aspects see 03F52}
03B48 Probability and inductive logic [See also 60A05]
03B50 Many-valued logic
03B52 Fuzzy logic; logic of vagueness [See also 68T27, 68T37, 94D05]
03B53 Paraconsistent logics
03B55 Intermediate logics
03B60 Other nonclassical logic
03B62 Combined logics
03B65 Logic of natural languages [See also 68T50, 91F20]
03B70 Logic in computer science [See also 68–XX]
03B80 Other applications of logic
03B99 None of the above, but in this section
03Cxx **Model theory**
03C05 Equational classes, universal algebra [See also 08Axx, 08Bxx, 18C05]
03C07 Basic properties of first-order languages and structures
03C10 Quantifier elimination, model completeness and related topics
03C13 Finite structures [See also 68Q15, 68Q19]
03C15 Denumerable structures
03C20 Ultraproducts and related constructions
03C25 Model-theoretic forcing
03C30 Other model constructions
03C35 Categoricity and completeness of theories
03C40 Interpolation, preservation, definability
03C45 Classification theory, stability and related concepts [See also 03C48]
03C48 Abstract elementary classes and related topics [See also 03C45]
03C50 Models with special properties (saturated, rigid, etc.)
03C52 Properties of classes of models
03C55 Set-theoretic model theory
03C57 Effective and recursion-theoretic model theory [See also 03D45]
03C60 Model-theoretic algebra [See also 08C10, 12Lxx, 13L05]
03C62 Models of arithmetic and set theory [See also 03Hxx]
03C64 Model theory of ordered structures; o-minimality
03C65 Models of other mathematical theories
03C68 Other classical first-order model theory
03C70 Logic on admissible sets
03C75 Other infinitary logic
03C80 Logic with extra quantifiers and operators [See also 03B42, 03B44, 03B45, 03B48]
03C85 Second- and higher-order model theory
03C90 Nonclassical models (Boolean-valued, sheaf, etc.)
03C95 Abstract model theory
03C98 Applications of model theory [See also 03C60]
03C99 None of the above, but in this section
03Dxx **Computability and recursion theory**
03D03 Thue and Post systems, etc.
03D05 Automata and formal grammars in connection with logical questions [See also 68Q45, 68Q70, 68R15]
03D10 Turing machines and related notions [See also 68Q05]
03D15 Complexity of computation (including implicit computational complexity) [See also 68Q15, 68Q17]
03D20 Recursive functions and relations, subrecursive hierarchies
03D25 Recursively (computably) enumerable sets and degrees
03D28 Other Turing degree structures
03D30 Other degrees and reducibilities
03D32 Algorithmic randomness and dimension [See also 68Q30]
03D35 Undecidability and degrees of sets of sentences
03D40 Word problems, etc. [See also 06B25, 08A50, 20F10, 68R15]
03D45 Theory of numerations, effectively presented structures [See also 03C57; for intuitionistic and similar approaches see 03F55]
03D50 Recursive equivalence types of sets and structures, isols
03D55 Hierarchies
03D60 Computability and recursion theory on ordinals, admissible sets, etc.
03D65 Higher-type and set recursion theory
03D70 Inductive definability
03D75 Abstract and axiomatic computability and recursion theory
03D78 Computation over the reals {For constructive aspects, see 03F60}
03D80 Applications of computability and recursion theory
03D99 None of the above, but in this section
03Exx **Set theory**
03E02 Partition relations
03E04 Ordered sets and their cofinalities; pcf theory
03E05 Other combinatorial set theory
03E10 Ordinal and cardinal numbers
03E15 Descriptive set theory [See also 28A05, 54H05]
03E17 Cardinal characteristics of the continuum
03E20 Other classical set theory (including functions, relations, and set algebra)
03E25 Axiom of choice and related propositions
03E30 Axiomatics of classical set theory and its fragments
03E35 Consistency and independence results
03E40 Other aspects of forcing and Boolean-valued models
03E45 Inner models, including constructibility, ordinal definability, and core models
03E47 Other notions of set-theoretic definability
03E50 Continuum hypothesis and Martin's axiom [See also 03E57]
03E55 Large cardinals
03E57 Generic absoluteness and forcing axioms [See also 03E50]
03E60 Determinacy principles
03E65 Other hypotheses and axioms
03E70 Nonclassical and second-order set theories
03E72 Fuzzy set theory
03E75 Applications of set theory
03E99 None of the above, but in this section
03Fxx **Proof theory and constructive mathematics**
03F03 Proof theory, general
03F05 Cut-elimination and normal-form theorems
03F07 Structure of proofs
03F10 Functionals in proof theory
03F15 Recursive ordinals and ordinal notations
03F20 Complexity of proofs
03F25 Relative consistency and interpretations
03F30 First-order arithmetic and fragments
03F35 Second- and higher-order arithmetic and fragments [See also 03B30]
03F40 Gödel numberings and issues of incompleteness
03F45 Provability logics and related algebras (e.g., diagonalizable algebras) [See also 03B45, 03G25, 06E25]
03F50 Metamathematics of constructive systems
03F52 Linear logic and other substructural logics [See also 03B47]
03F55 Intuitionistic mathematics
03F60 Constructive and recursive analysis [See also 03B30, 03D45, 03D78, 26E40, 46S30, 47S30]
03F65 Other constructive mathematics [See also 03D45]
03F99 None of the above, but in this section
03Gxx **Algebraic logic**
03G05 Boolean algebras [See also 06Exx]
03G10 Lattices and related structures [See also 06Bxx]
03G12 Quantum logic [See also 06C15, 81P10]
03G15 Cylindric and polyadic algebras; relation algebras
03G20 Łukasiewicz and Post algebras [See also 06D25, 06D30]
03G25 Other algebras related to logic [See also 03F45, 06D20, 06E25, 06F35]
03G27 Abstract algebraic logic
03G30 Categorical logic, topoi [See also 18B25, 18C05, 18C10]
03G99 None of the above, but in this section
03Hxx **Nonstandard models [See also 03C62]**
03H05 Nonstandard models in mathematics [See also 26E35, 28E05, 30G06, 46S20, 47S20, 54J05]
03H10 Other applications of nonstandard models (economics, physics, etc.)
03H15 Nonstandard models of arithmetic [See also 11U10, 12L15, 13L05]
03H99 None of the above, but in this section

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05-XX **COMBINATORICS {For finite fields, see 11Txx}**
- 05-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
- 05-01 Instructional exposition (textbooks, tutorial papers, etc.)
- 05-02 Research exposition (monographs, survey articles)
- 05-03 Historical (must also be assigned at least one classification number from Section 01)
- 05-04 Explicit machine computation and programs (not the theory of computation or programming)
- 05-06 Proceedings, conferences, collections, etc.

05Axx **Enumerative combinatorics {For enumeration in graph theory, see 05C30}**
- 05A05 Permutations, words, matrices
- 05A10 Factorials, binomial coefficients, combinatorial functions [See also 11B65, 33Cxx]
- 05A15 Exact enumeration problems, generating functions [See also 33Cxx, 33Dxx]
- 05A16 Asymptotic enumeration
- 05A17 Partitions of integers [See also 11P81, 11P82, 11P83]
- 05A18 Partitions of sets
- 05A19 Combinatorial identities, bijective combinatorics
- 05A20 Combinatorial inequalities
- 05A30 q-calculus and related topics [See also 33Dxx]
- 05A40 Umbral calculus
- 05A99 None of the above, but in this section

05Bxx **Designs and configurations {For applications of design theory, see 94C30}**
- 05B05 Block designs [See also 51E05, 62K10]
- 05B07 Triple systems
- 05B10 Difference sets (number-theoretic, group-theoretic, etc.) [See also 11B13]
- 05B15 Orthogonal arrays, Latin squares, Room squares
- 05B20 Matrices (incidence, Hadamard, etc.)
- 05B25 Finite geometries [See also 51D20, 51Exx]
- 05B30 Other designs, configurations [See also 51E30]
- 05B35 Matroids, geometric lattices [See also 52B40, 90C27]
- 05B40 Packing and covering [See also 11H31, 52C15, 52C17]
- 05B45 Tessellation and tiling problems [See also 52C20, 52C22]
- 05B50 Polyominoes
- 05B99 None of the above, but in this section

05Cxx **Graph theory {For applications of graphs, see 68R10, 81Q30, 81T15, 82B20, 82C20, 90C35, 92E10, 94C15}**
- 05C05 Trees
- 05C07 Vertex degrees [See also 05E30]
- 05C10 Planar graphs; geometric and topological aspects of graph theory [See also 57M15, 57M25]
- 05C12 Distance in graphs
- 05C15 Coloring of graphs and hypergraphs
- 05C17 Perfect graphs
- 05C20 Directed graphs (digraphs), tournaments
- 05C21 Flows in graphs
- 05C22 Signed and weighted graphs
- 05C25 Graphs and abstract algebra (groups, rings, fields, etc.) [See also 20F65]
- 05C30 Enumeration in graph theory
- 05C31 Graph polynomials
- 05C35 Extremal problems [See also 90C35]
- 05C38 Paths and cycles [See also 90B10]
- 05C40 Connectivity
- 05C42 Density (toughness, etc.)
- 05C45 Eulerian and Hamiltonian graphs
- 05C50 Graphs and linear algebra (matrices, eigenvalues, etc.)
- 05C51 Graph designs and isomomorphic decomposition [See also 05B30]
- 05C55 Generalized Ramsey theory [See also 05D10]
- 05C57 Games on graphs [See also 91A43, 91A46]
- 05C60 Isomorphism problems (reconstruction conjecture, etc.) and homomorphisms (subgraph embedding, etc.)
- 05C62 Graph representations (geometric and intersection representations, etc.) For graph drawing, see also 68R10
- 05C63 Infinite graphs
- 05C65 Hypergraphs
- 05C69 Dominating sets, independent sets, cliques
- 05C70 Factorization, matching, partitioning, covering and packing
- 05C72 Fractional graph theory, fuzzy graph theory
- 05C75 Structural characterization of families of graphs
- 05C76 Graph operations (line graphs, products, etc.)
- 05C78 Graph labelling (graceful graphs, bandwidth, etc.)
- 05C80 Random graphs [See also 60B20]
- 05C81 Random walks on graphs
- 05C82 Small world graphs, complex networks [See also 90Bxx, 91D30]
- 05C83 Graph minors
- 05C85 Graph algorithms [See also 68R10, 68W05]
- 05C90 Applications [See also 68R10, 81Q30, 81T15, 82B20, 82C20, 90C35, 92E10, 94C15]
- 05C99 None of the above, but in this section

05Dxx **Extremal combinatorics**
- 05D05 Extremal set theory
- 05D10 Ramsey theory [See also 05C55]
- 05D15 Transversal (matching) theory
- 05D40 Probabilistic methods
- 05D99 None of the above, but in this section

05Exx **Algebraic combinatorics**
- 05E05 Symmetric functions and generalizations
- 05E10 Combinatorial aspects of representation theory [See also 20C30]
- 05E15 Combinatorial aspects of groups and algebras [See also 14Nxx, 22E45, 33C80]
- 05E18 Group actions on combinatorial structures
- 05E30 Association schemes, strongly regular graphs
- 05E40 Combinatorial aspects of commutative algebra
- 05E45 Combinatorial aspects of simplicial complexes
- 05E99 None of the above, but in this section

06-XX **ORDER, LATTICES, ORDERED ALGEBRAIC STRUCTURES [See also 18B35]**
- 06-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
- 06-01 Instructional exposition (textbooks, tutorial papers, etc.)
- 06-02 Research exposition (monographs, survey articles)
- 06-03 Historical (must also be assigned at least one classification number from Section 01)
- 06-04 Explicit machine computation and programs (not the theory of computation or programming)
- 06-06 Proceedings, conferences, collections, etc.

06Axx **Ordered sets**
- 06A05 Total order
- 06A06 Partial order, general
- 06A07 Combinatorics of partially ordered sets
- 06A11 Algebraic aspects of posets
- 06A12 Semilattices [See also 20M10; for topological semilattices see 22A26]
- 06A15 Galois correspondences, closure operators
- 06A75 Generalizations of ordered sets
- 06A99 None of the above, but in this section

06Bxx **Lattices [See also 03G10]**
- 06B05 Structure theory
- 06B10 Ideals, congruence relations
- 06B15 Representation theory
- 06B20 Varieties of lattices
- 06B23 Complete lattices, completions
- 06B25 Free lattices, projective lattices, word problems [See also 03D40, 08A50, 20F10]
- 06B30 Topological lattices, order topologies [See also 06F30, 22A26, 54F05, 54H12]
- 06B35 Continuous lattices and posets, applications [See also 06B30, 06D10, 06F30, 18B35, 22A26, 68Q55]
- 06B75 Generalizations of lattices
- 06B99 None of the above, but in this section

06Cxx **Modular lattices, complemented lattices**
- 06C05 Modular lattices, Desarguesian lattices
- 06C10 Semimodular lattices, geometric lattices
- 06C15 Complemented lattices, orthocomplemented lattices and posets [See also 03G12, 81P10]
- 06C20 Complemented modular lattices, continuous geometries
- 06C99 None of the above, but in this section

06Dxx **Distributive lattices**
- 06D05 Structure and representation theory
- 06D10 Complete distributivity
- 06D15 Pseudocomplemented lattices
- 06D20 Heyting algebras [See also 03G25]
- 06D22 Frames, locales {For topological questions see 54–XX}
- 06D25 Post algebras [See also 03G20]
- 06D30 De Morgan algebras, Łukasiewicz algebras [See also 03G20]
- 06D35 MV-algebras
- 06D50 Lattices and duality
- 06D72 Fuzzy lattices (soft algebras) and related topics
- 06D75 Other generalizations of distributive lattices
- 06D99 None of the above, but in this section

06Exx **Boolean algebras (Boolean rings) [See also 03G05]**
- 06E05 Structure theory
- 06E10 Chain conditions, complete algebras
- 06E15 Stone spaces (Boolean spaces) and related structures
- 06E20 Ring-theoretic properties [See also 16E50, 16G30]

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06E25 Boolean algebras with additional operations (diagonalizable algebras, etc.) [See also 03G25, 03F45]
06E30 Boolean functions [See also 94C10]
06E75 Generalizations of Boolean algebras
06E99 None of the above, but in this section
06Fxx **Ordered structures**
06F05 Ordered semigroups and monoids [See also 20Mxx]
06F07 Quantales
06F10 Noether lattices
06F15 Ordered groups [See also 20F60]
06F20 Ordered abelian groups, Riesz groups, ordered linear spaces [See also 46A40]
06F25 Ordered rings, algebras, modules {For ordered fields, see 12J15; see also 13J25, 16W80}
06F30 Topological lattices, order topologies [See also 06B30, 22A26, 54F05, 54H12]
06F35 BCK-algebras, BCI-algebras [See also 03G25]
06F99 None of the above, but in this section

08-XX **GENERAL ALGEBRAIC SYSTEMS**
08-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
08-01 Instructional exposition (textbooks, tutorial papers, etc.)
08-02 Research exposition (monographs, survey articles)
08-03 Historical (must also be assigned at least one classification number from Section 01)
08-04 Explicit machine computation and programs (not the theory of computation or programming)
08-06 Proceedings, conferences, collections, etc.
08Axx **Algebraic structures [See also 03C05]**
08A02 Relational systems, laws of composition
08A05 Structure theory
08A30 Subalgebras, congruence relations
08A35 Automorphisms, endomorphisms
08A40 Operations, polynomials, primal algebras
08A45 Equational compactness
08A50 Word problems [See also 03D40, 06B25, 20F10, 68R15]
08A55 Partial algebras
08A60 Unary algebras
08A62 Finitary algebras
08A65 Infinitary algebras
08A68 Heterogeneous algebras
08A70 Applications of universal algebra in computer science
08A72 Fuzzy algebraic structures
08A99 None of the above, but in this section
08Bxx **Varieties [See also 03C05]**
08B05 Equational logic, Mal′cev (Mal′tsev) conditions
08B10 Congruence modularity, congruence distributivity
08B15 Lattices of varieties
08B20 Free algebras
08B25 Products, amalgamated products, and other kinds of limits and colimits [See also 18A30]
08B26 Subdirect products and subdirect irreducibility
08B30 Injectives, projectives
08B99 None of the above, but in this section
08Cxx **Other classes of algebras**
08C05 Categories of algebras [See also 18C05]
08C10 Axiomatic model classes [See also 03Cxx, in particular 03C60]
08C15 Quasivarieties
08C20 Natural dualities for classes of algebras [See also 06E15, 18A40, 22A30]
08C99 None of the above, but in this section

11-XX **NUMBER THEORY**
11-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
11-01 Instructional exposition (textbooks, tutorial papers, etc.)
11-02 Research exposition (monographs, survey articles)
11-03 Historical (must also be assigned at least one classification number from Section 01)
11-04 Explicit machine computation and programs (not the theory of computation or programming)
11-06 Proceedings, conferences, collections, etc.
11Axx **Elementary number theory {For analogues in number fields, see 11R04}**
11A05 Multiplicative structure; Euclidean algorithm; greatest common divisors
11A07 Congruences; primitive roots; residue systems
11A15 Power residues, reciprocity
11A25 Arithmetic functions; related numbers; inversion formulas
11A41 Primes
11A51 Factorization; primality
11A55 Continued fractions {For approximation results, see 11J70} [See also 11K50, 30B70, 40A15]
11A63 Radix representation; digital problems {For metric results, see 11K16}
11A67 Other representations
11A99 None of the above, but in this section
11Bxx **Sequences and sets**
11B05 Density, gaps, topology
11B13 Additive bases, including sumsets [See also 05B10]
11B25 Arithmetic progressions [See also 11N13]
11B30 Arithmetic combinatorics; higher degree uniformity
11B34 Representation functions
11B37 Recurrences {For applications to special functions, see 33–XX}
11B39 Fibonacci and Lucas numbers and polynomials and generalizations
11B50 Sequences (mod m)
11B57 Farey sequences; the sequences $1^k, 2^k, \cdots$
11B65 Binomial coefficients; factorials; q-identities [See also 05A10, 05A30]
11B68 Bernoulli and Euler numbers and polynomials
11B73 Bell and Stirling numbers
11B75 Other combinatorial number theory
11B83 Special sequences and polynomials
11B85 Automata sequences
11B99 None of the above, but in this section
11Cxx **Polynomials and matrices**
11C08 Polynomials [See also 13F20]
11C20 Matrices, determinants [See also 15B36]
11C99 None of the above, but in this section
11Dxx **Diophantine equations [See also 11Gxx, 14Gxx]**
11D04 Linear equations
11D07 The Frobenius problem
11D09 Quadratic and bilinear equations
11D25 Cubic and quartic equations
11D41 Higher degree equations; Fermat's equation
11D45 Counting solutions of Diophantine equations
11D57 Multiplicative and norm form equations
11D59 Thue-Mahler equations
11D61 Exponential equations
11D68 Rational numbers as sums of fractions
11D72 Equations in many variables [See also 11P55]
11D75 Diophantine inequalities [See also 11J25]
11D79 Congruences in many variables
11D85 Representation problems [See also 11P55]
11D88 p-adic and power series fields
11D99 None of the above, but in this section
11Exx **Forms and linear algebraic groups [See also 19Gxx] {For quadratic forms in linear algebra, see 15A63}**
11E04 Quadratic forms over general fields
11E08 Quadratic forms over local rings and fields
11E10 Forms over real fields
11E12 Quadratic forms over global rings and fields
11E16 General binary quadratic forms
11E20 General ternary and quaternary quadratic forms; forms of more than two variables
11E25 Sums of squares and representations by other particular quadratic forms
11E39 Bilinear and Hermitian forms
11E41 Class numbers of quadratic and Hermitian forms
11E45 Analytic theory (Epstein zeta functions; relations with automorphic forms and functions)
11E57 Classical groups [See also 14Lxx, 20Gxx]
11E70 K-theory of quadratic and Hermitian forms
11E72 Galois cohomology of linear algebraic groups [See also 20G10]
11E76 Forms of degree higher than two
11E81 Algebraic theory of quadratic forms; Witt groups and rings [See also 19G12, 19G24]
11E88 Quadratic spaces; Clifford algebras [See also 15A63, 15A66]
11E95 p-adic theory
11E99 None of the above, but in this section
11Fxx **Discontinuous groups and automorphic forms [See also 11R39, 11S37, 14Gxx, 14Kxx, 22E50, 22E55, 30F35, 32Nxx] {For relations with quadratic forms, see 11E45}**
11F03 Modular and automorphic functions
11F06 Structure of modular groups and generalizations; arithmetic groups [See also 20H05, 20H10, 22E40]
11F11 Holomorphic modular forms of integral weight
11F12 Automorphic forms, one variable
11F20 Dedekind eta function, Dedekind sums
11F22 Relationship to Lie algebras and finite simple groups
11F23 Relations with algebraic geometry and topology

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11F25 Hecke-Petersson operators, differential operators (one variable)
11F27 Theta series; Weil representation; theta correspondences
11F30 Fourier coefficients of automorphic forms
11F32 Modular correspondences, etc.
11F33 Congruences for modular and p-adic modular forms [See also 14G20, 22E50]
11F37 Forms of half-integer weight; nonholomorphic modular forms
11F41 Automorphic forms on GL(2); Hilbert and Hilbert-Siegel modular groups and their modular and automorphic forms; Hilbert modular surfaces [See also 14J20]
11F46 Siegel modular groups; Siegel and Hilbert-Siegel modular and automorphic forms
11F50 Jacobi forms
11F52 Modular forms associated to Drinfel′d modules
11F55 Other groups and their modular and automorphic forms (several variables)
11F60 Hecke-Petersson operators, differential operators (several variables)
11F66 Langlands L-functions; one variable Dirichlet series and functional equations
11F67 Special values of automorphic L-series, periods of modular forms, cohomology, modular symbols
11F68 Dirichlet series in several complex variables associated to automorphic forms; Weyl group multiple Dirichlet series
11F70 Representation-theoretic methods; automorphic representations over local and global fields
11F72 Spectral theory; Selberg trace formula
11F75 Cohomology of arithmetic groups
11F80 Galois representations
11F85 p-adic theory, local fields [See also 14G20, 22E50]
11F99 None of the above, but in this section

11Gxx **Arithmetic algebraic geometry (Diophantine geometry) [See also 11Dxx, 14Gxx, 14Kxx]**
11G05 Elliptic curves over global fields [See also 14H52]
11G07 Elliptic curves over local fields [See also 14G20, 14H52]
11G09 Drinfel′d modules; higher-dimensional motives, etc. [See also 14L05]
11G10 Abelian varieties of dimension > 1 [See also 14Kxx]
11G15 Complex multiplication and moduli of abelian varieties [See also 14K22]
11G16 Elliptic and modular units [See also 11R27]
11G18 Arithmetic aspects of modular and Shimura varieties [See also 14G35]
11G20 Curves over finite and local fields [See also 14H25]
11G25 Varieties over finite and local fields [See also 14G15, 14G20]
11G30 Curves of arbitrary genus or genus $\neq 1$ over global fields [See also 14H25]
11G32 Dessins d'enfants, Belyĭ theory
11G35 Varieties over global fields [See also 14G25]
11G40 L-functions of varieties over global fields; Birch-Swinnerton-Dyer conjecture [See also 14G10]
11G42 Arithmetic mirror symmetry [See also 14J33]
11G45 Geometric class field theory [See also 11R37, 14C35, 19F05]
11G50 Heights [See also 14G40, 37P30]
11G55 Polylogarithms and relations with K-theory
11G99 None of the above, but in this section

11Hxx **Geometry of numbers {For applications in coding theory, see 94B75}**
11H06 Lattices and convex bodies [See also 11P21, 52C05, 52C07]
11H16 Nonconvex bodies
11H31 Lattice packing and covering [See also 05B40, 52C15, 52C17]
11H46 Products of linear forms
11H50 Minima of forms
11H55 Quadratic forms (reduction theory, extreme forms, etc.)
11H56 Automorphism groups of lattices
11H60 Mean value and transfer theorems
11H71 Relations with coding theory
11H99 None of the above, but in this section

11Jxx **Diophantine approximation, transcendental number theory [See also 11K60]**
11J04 Homogeneous approximation to one number
11J06 Markov and Lagrange spectra and generalizations
11J13 Simultaneous homogeneous approximation, linear forms
11J17 Approximation by numbers from a fixed field
11J20 Inhomogeneous linear forms
11J25 Diophantine inequalities [See also 11D75]
11J54 Small fractional parts of polynomials and generalizations
11J61 Approximation in non-Archimedean valuations
11J68 Approximation to algebraic numbers
11J70 Continued fractions and generalizations [See also 11A55, 11K50]
11J71 Distribution modulo one [See also 11K06]
11J72 Irrationality; linear independence over a field
11J81 Transcendence (general theory)
11J82 Measures of irrationality and of transcendence
11J83 Metric theory
11J85 Algebraic independence; Gel′fond's method
11J86 Linear forms in logarithms; Baker's method
11J87 Schmidt Subspace Theorem and applications
11J89 Transcendence theory of elliptic and abelian functions
11J91 Transcendence theory of other special functions
11J93 Transcendence theory of Drinfel′d and t-modules
11J95 Results involving abelian varieties
11J97 Analogues of methods in Nevanlinna theory (work of Vojta et al.)
11J99 None of the above, but in this section

11Kxx **Probabilistic theory: distribution modulo 1; metric theory of algorithms**
11K06 General theory of distribution modulo 1 [See also 11J71]
11K16 Normal numbers, radix expansions, Pisot numbers, Salem numbers, good lattice points, etc. [See also 11A63]
11K31 Special sequences
11K36 Well-distributed sequences and other variations
11K38 Irregularities of distribution, discrepancy [See also 11Nxx]
11K41 Continuous, p-adic and abstract analogues
11K45 Pseudo-random numbers; Monte Carlo methods
11K50 Metric theory of continued fractions [See also 11A55, 11J70]
11K55 Metric theory of other algorithms and expansions; measure and Hausdorff dimension [See also 11N99, 28Dxx]
11K60 Diophantine approximation [See also 11Jxx]
11K65 Arithmetic functions [See also 11Nxx]
11K70 Harmonic analysis and almost periodicity
11K99 None of the above, but in this section

11Lxx **Exponential sums and character sums {For finite fields, see 11Txx}**
11L03 Trigonometric and exponential sums, general
11L05 Gauss and Kloosterman sums; generalizations
11L07 Estimates on exponential sums
11L10 Jacobsthal and Brewer sums; other complete character sums
11L15 Weyl sums
11L20 Sums over primes
11L26 Sums over arbitrary intervals
11L40 Estimates on character sums
11L99 None of the above, but in this section

11Mxx **Zeta and L-functions: analytic theory**
11M06 $\zeta(s)$ and $L(s, \chi)$
11M20 Real zeros of $L(s, \chi)$; results on $L(1, \chi)$
11M26 Nonreal zeros of $\zeta(s)$ and $L(s, \chi)$; Riemann and other hypotheses
11M32 Multiple Dirichlet series and zeta functions and multizeta values
11M35 Hurwitz and Lerch zeta functions
11M36 Selberg zeta functions and regularized determinants; applications to spectral theory, Dirichlet series, Eisenstein series, etc. Explicit formulas
11M38 Zeta and L-functions in characteristic p
11M41 Other Dirichlet series and zeta functions {For local and global ground fields, see 11R42, 11R52, 11S40, 11S45; for algebro-geometric methods, see 14G10; see also 11E45, 11F66, 11F70, 11F72}
11M45 Tauberian theorems [See also 40E05]
11M50 Relations with random matrices
11M55 Relations with noncommutative geometry
11M99 None of the above, but in this section

11Nxx **Multiplicative number theory**
11N05 Distribution of primes
11N13 Primes in progressions [See also 11B25]
11N25 Distribution of integers with specified multiplicative constraints
11N30 Turán theory [See also 30Bxx]
11N32 Primes represented by polynomials; other multiplicative structure of polynomial values
11N35 Sieves
11N36 Applications of sieve methods
11N37 Asymptotic results on arithmetic functions
11N45 Asymptotic results on counting functions for algebraic and topological structures
11N56 Rate of growth of arithmetic functions
11N60 Distribution functions associated with additive and positive multiplicative functions
11N64 Other results on the distribution of values or the characterization of arithmetic functions
11N69 Distribution of integers in special residue classes
11N75 Applications of automorphic functions and forms to multiplicative problems [See also 11Fxx]
11N80 Generalized primes and integers
11N99 None of the above, but in this section

11Pxx **Additive number theory; partitions**
11P05 Waring's problem and variants
11P21 Lattice points in specified regions
11P32 Goldbach-type theorems; other additive questions involving primes

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11P55 Applications of the Hardy-Littlewood method [See also 11D85]
11P70 Inverse problems of additive number theory, including sumsets
11P81 Elementary theory of partitions [See also 05A17]
11P82 Analytic theory of partitions
11P83 Partitions; congruences and congruential restrictions
11P84 Partition identities; identities of Rogers-Ramanujan type
11P99 None of the above, but in this section

11Rxx **Algebraic number theory: global fields {For complex multiplication, see 11G15}**
11R04 Algebraic numbers; rings of algebraic integers
11R06 PV-numbers and generalizations; other special algebraic numbers; Mahler measure
11R09 Polynomials (irreducibility, etc.)
11R11 Quadratic extensions
11R16 Cubic and quartic extensions
11R18 Cyclotomic extensions
11R20 Other abelian and metabelian extensions
11R21 Other number fields
11R23 Iwasawa theory
11R27 Units and factorization
11R29 Class numbers, class groups, discriminants
11R32 Galois theory
11R33 Integral representations related to algebraic numbers; Galois module structure of rings of integers [See also 20C10]
11R34 Galois cohomology [See also 12Gxx, 19A31]
11R37 Class field theory
11R39 Langlands-Weil conjectures, nonabelian class field theory [See also 11Fxx, 22E55]
11R42 Zeta functions and L-functions of number fields [See also 11M41, 19F27]
11R44 Distribution of prime ideals [See also 11N05]
11R45 Density theorems
11R47 Other analytic theory [See also 11Nxx]
11R52 Quaternion and other division algebras: arithmetic, zeta functions
11R54 Other algebras and orders, and their zeta and L-functions [See also 11S45, 16Hxx, 16Kxx]
11R56 Adèle rings and groups
11R58 Arithmetic theory of algebraic function fields [See also 14–XX]
11R60 Cyclotomic function fields (class groups, Bernoulli objects, etc.)
11R65 Class groups and Picard groups of orders
11R70 K-theory of global fields [See also 19Fxx]
11R80 Totally real fields [See also 12J15]
11R99 None of the above, but in this section

11Sxx **Algebraic number theory: local and p-adic fields**
11S05 Polynomials
11S15 Ramification and extension theory
11S20 Galois theory
11S23 Integral representations
11S25 Galois cohomology [See also 12Gxx, 16H05]
11S31 Class field theory; p-adic formal groups [See also 14L05]
11S37 Langlands-Weil conjectures, nonabelian class field theory [See also 11Fxx, 22E50]
11S40 Zeta functions and L-functions [See also 11M41, 19F27]
11S45 Algebras and orders, and their zeta functions [See also 11R52, 11R54, 16Hxx, 16Kxx]
11S70 K-theory of local fields [See also 19Fxx]
11S80 Other analytic theory (analogues of beta and gamma functions, p-adic integration, etc.)
11S82 Non-Archimedean dynamical systems [See mainly 37Pxx]
11S85 Other nonanalytic theory
11S90 Prehomogeneous vector spaces
11S99 None of the above, but in this section

11Txx **Finite fields and commutative rings (number-theoretic aspects)**
11T06 Polynomials
11T22 Cyclotomy
11T23 Exponential sums
11T24 Other character sums and Gauss sums
11T30 Structure theory
11T55 Arithmetic theory of polynomial rings over finite fields
11T60 Finite upper half-planes
11T71 Algebraic coding theory; cryptography
11T99 None of the above, but in this section

11Uxx **Connections with logic**
11U05 Decidability [See also 03B25]
11U07 Ultraproducts [See also 03C20]
11U09 Model theory [See also 03Cxx]
11U10 Nonstandard arithmetic [See also 03H15]
11U99 None of the above, but in this section

11Yxx **Computational number theory [See also 11–04]**
11Y05 Factorization
11Y11 Primality
11Y16 Algorithms; complexity [See also 68Q25]
11Y35 Analytic computations
11Y40 Algebraic number theory computations
11Y50 Computer solution of Diophantine equations
11Y55 Calculation of integer sequences
11Y60 Evaluation of constants
11Y65 Continued fraction calculations
11Y70 Values of arithmetic functions; tables
11Y99 None of the above, but in this section

11Zxx **Miscellaneous applications of number theory**
11Z05 Miscellaneous applications of number theory
11Z99 None of the above, but in this section

12-XX **FIELD THEORY AND POLYNOMIALS**
12-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
12-01 Instructional exposition (textbooks, tutorial papers, etc.)
12-02 Research exposition (monographs, survey articles)
12-03 Historical (must also be assigned at least one classification number from Section 01)
12-04 Explicit machine computation and programs (not the theory of computation or programming)
12-06 Proceedings, conferences, collections, etc.

12Dxx **Real and complex fields**
12D05 Polynomials: factorization
12D10 Polynomials: location of zeros (algebraic theorems) {For the analytic theory, see 26C10, 30C15}
12D15 Fields related with sums of squares (formally real fields, Pythagorean fields, etc.) [See also 11Exx]
12D99 None of the above, but in this section

12Exx **General field theory**
12E05 Polynomials (irreducibility, etc.)
12E10 Special polynomials
12E12 Equations
12E15 Skew fields, division rings [See also 11R52, 11R54, 11S45, 16Kxx]
12E20 Finite fields (field-theoretic aspects)
12E25 Hilbertian fields; Hilbert's irreducibility theorem
12E30 Field arithmetic
12E99 None of the above, but in this section

12Fxx **Field extensions**
12F05 Algebraic extensions
12F10 Separable extensions, Galois theory
12F12 Inverse Galois theory
12F15 Inseparable extensions
12F20 Transcendental extensions
12F99 None of the above, but in this section

12Gxx **Homological methods (field theory)**
12G05 Galois cohomology [See also 14F22, 16Hxx, 16K50]
12G10 Cohomological dimension
12G99 None of the above, but in this section

12Hxx **Differential and difference algebra**
12H05 Differential algebra [See also 13Nxx]
12H10 Difference algebra [See also 39Axx]
12H20 Abstract differential equations [See also 34Mxx]
12H25 p-adic differential equations [See also 11S80, 14G20]
12H99 None of the above, but in this section

12Jxx **Topological fields**
12J05 Normed fields
12J10 Valued fields
12J12 Formally p-adic fields
12J15 Ordered fields
12J17 Topological semifields
12J20 General valuation theory [See also 13A18]
12J25 Non-Archimedean valued fields [See also 30G06, 32P05, 46S10, 47S10]
12J27 Krasner-Tate algebras [See mainly 32P05; see also 46S10, 47S10]
12J99 None of the above, but in this section

12Kxx **Generalizations of fields**
12K05 Near-fields [See also 16Y30]
12K10 Semifields [See also 16Y60]
12K99 None of the above, but in this section

12Lxx **Connections with logic**
12L05 Decidability [See also 03B25]
12L10 Ultraproducts [See also 03C20]
12L12 Model theory [See also 03C60]
12L15 Nonstandard arithmetic [See also 03H15]
12L99 None of the above, but in this section

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12Yxx **Computational aspects of field theory and polynomials**
12Y05 Computational aspects of field theory and polynomials
12Y99 None of the above, but in this section

13-XX **COMMUTATIVE ALGEBRA**
13-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
13-01 Instructional exposition (textbooks, tutorial papers, etc.)
13-02 Research exposition (monographs, survey articles)
13-03 Historical (must also be assigned at least one classification number from Section 01)
13-04 Explicit machine computation and programs (not the theory of computation or programming)
13-06 Proceedings, conferences, collections, etc.
13Axx **General commutative ring theory**
13A02 Graded rings [See also 16W50]
13A05 Divisibility; factorizations [See also 13F15]
13A15 Ideals; multiplicative ideal theory
13A18 Valuations and their generalizations [See also 12J20]
13A30 Associated graded rings of ideals (Rees ring, form ring), analytic spread and related topics
13A35 Characteristic p methods (Frobenius endomorphism) and reduction to characteristic p; tight closure [See also 13B22]
13A50 Actions of groups on commutative rings; invariant theory [See also 14L24]
13A99 None of the above, but in this section
13Bxx **Ring extensions and related topics**
13B02 Extension theory
13B05 Galois theory
13B10 Morphisms
13B21 Integral dependence; going up, going down
13B22 Integral closure of rings and ideals [See also 13A35]; integrally closed rings, related rings (Japanese, etc.)
13B25 Polynomials over commutative rings [See also 11C08, 11T06, 13F20, 13M10]
13B30 Rings of fractions and localization [See also 16S85]
13B35 Completion [See also 13J10]
13B40 Étale and flat extensions; Henselization; Artin approximation [See also 13J15, 14B12, 14B25]
13B99 None of the above, but in this section
13Cxx **Theory of modules and ideals**
13C05 Structure, classification theorems
13C10 Projective and free modules and ideals [See also 19A13]
13C11 Injective and flat modules and ideals
13C12 Torsion modules and ideals
13C13 Other special types
13C14 Cohen-Macaulay modules [See also 13H10]
13C15 Dimension theory, depth, related rings (catenary, etc.)
13C20 Class groups [See also 11R29]
13C40 Linkage, complete intersections and determinantal ideals [See also 14M06, 14M10, 14M12]
13C60 Module categories
13C99 None of the above, but in this section
13Dxx **Homological methods {For noncommutative rings, see 16Exx; for general categories, see 18Gxx}**
13D02 Syzygies, resolutions, complexes
13D03 (Co)homology of commutative rings and algebras (e.g., Hochschild, André-Quillen, cyclic, dihedral, etc.)
13D05 Homological dimension
13D07 Homological functors on modules (Tor, Ext, etc.)
13D09 Derived categories
13D10 Deformations and infinitesimal methods [See also 14B10, 14B12, 14D15, 32Gxx]
13D15 Grothendieck groups, K-theory [See also 14C35, 18F30, 19Axx, 19D50]
13D22 Homological conjectures (intersection theorems)
13D30 Torsion theory [See also 13C12, 18E40]
13D40 Hilbert-Samuel and Hilbert-Kunz functions; Poincaré series
13D45 Local cohomology [See also 14B15]
13D99 None of the above, but in this section
13Exx **Chain conditions, finiteness conditions**
13E05 Noetherian rings and modules
13E10 Artinian rings and modules, finite-dimensional algebras
13E15 Rings and modules of finite generation or presentation; number of generators
13E99 None of the above, but in this section
13Fxx **Arithmetic rings and other special rings**
13F05 Dedekind, Prüfer, Krull and Mori rings and their generalizations
13F07 Euclidean rings and generalizations
13F10 Principal ideal rings
13F15 Rings defined by factorization properties (e.g., atomic, factorial, half-factorial) [See also 13A05, 14M05]
13F20 Polynomial rings and ideals; rings of integer-valued polynomials [See also 11C08, 13B25]
13F25 Formal power series rings [See also 13J05]
13F30 Valuation rings [See also 13A18]
13F35 Witt vectors and related rings
13F40 Excellent rings
13F45 Seminormal rings
13F50 Rings with straightening laws, Hodge algebras
13F55 Stanley-Reisner face rings; simplicial complexes [See also 55U10]
13F60 Cluster algebras
13F99 None of the above, but in this section
13Gxx **Integral domains**
13G05 Integral domains
13G99 None of the above, but in this section
13Hxx **Local rings and semilocal rings**
13H05 Regular local rings
13H10 Special types (Cohen-Macaulay, Gorenstein, Buchsbaum, etc.) [See also 14M05]
13H15 Multiplicity theory and related topics [See also 14C17]
13H99 None of the above, but in this section
13Jxx **Topological rings and modules [See also 16W60, 16W80]**
13J05 Power series rings [See also 13F25]
13J07 Analytical algebras and rings [See also 32B05]
13J10 Complete rings, completion [See also 13B35]
13J15 Henselian rings [See also 13B40]
13J20 Global topological rings
13J25 Ordered rings [See also 06F25]
13J30 Real algebra [See also 12D15, 14Pxx]
13J99 None of the above, but in this section
13Lxx **Applications of logic to commutative algebra [See also 03Cxx, 03Hxx]**
13L05 Applications of logic to commutative algebra [See also 03Cxx, 03Hxx]
13L99 None of the above, but in this section
13Mxx **Finite commutative rings {For number-theoretic aspects, see 11Txx}**
13M05 Structure
13M10 Polynomials
13M99 None of the above, but in this section
13Nxx **Differential algebra [See also 12H05, 14F10]**
13N05 Modules of differentials
13N10 Rings of differential operators and their modules [See also 16S32, 32C38]
13N15 Derivations
13N99 None of the above, but in this section
13Pxx **Computational aspects and applications [See also 14Qxx, 68W30]**
13P05 Polynomials, factorization [See also 12Y05]
13P10 Gröbner bases; other bases for ideals and modules (e.g., Janet and border bases)
13P15 Solving polynomial systems; resultants
13P20 Computational homological algebra [See also 13Dxx]
13P25 Applications of commutative algebra (e.g., to statistics, control theory, optimization, etc.)
13P99 None of the above, but in this section

14-XX **ALGEBRAIC GEOMETRY**
14-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
14-01 Instructional exposition (textbooks, tutorial papers, etc.)
14-02 Research exposition (monographs, survey articles)
14-03 Historical (must also be assigned at least one classification number from Section 01)
14-04 Explicit machine computation and programs (not the theory of computation or programming)
14-06 Proceedings, conferences, collections, etc.
14Axx **Foundations**
14A05 Relevant commutative algebra [See also 13–XX]
14A10 Varieties and morphisms
14A15 Schemes and morphisms
14A20 Generalizations (algebraic spaces, stacks)
14A22 Noncommutative algebraic geometry [See also 16S38]
14A25 Elementary questions
14A99 None of the above, but in this section
14Bxx **Local theory**
14B05 Singularities [See also 14E15, 14H20, 14J17, 32Sxx, 58Kxx]
14B07 Deformations of singularities [See also 14D15, 32S30]
14B10 Infinitesimal methods [See also 13D10]
14B12 Local deformation theory, Artin approximation, etc. [See also 13B40, 13D10]
14B15 Local cohomology [See also 13D45, 32C36]
14B20 Formal neighborhoods
14B25 Local structure of morphisms: étale, flat, etc. [See also 13B40]

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14B99 None of the above, but in this section
14Cxx **Cycles and subschemes**
14C05 Parametrization (Chow and Hilbert schemes)
14C15 (Equivariant) Chow groups and rings; motives
14C17 Intersection theory, characteristic classes, intersection multiplicities [See also 13H15]
14C20 Divisors, linear systems, invertible sheaves
14C21 Pencils, nets, webs [See also 53A60]
14C22 Picard groups
14C25 Algebraic cycles
14C30 Transcendental methods, Hodge theory [See also 14D07, 32G20, 32J25, 32S35], Hodge conjecture
14C34 Torelli problem [See also 32G20]
14C35 Applications of methods of algebraic K-theory [See also 19Exx]
14C40 Riemann-Roch theorems [See also 19E20, 19L10]
14C99 None of the above, but in this section
14Dxx **Families, fibrations**
14D05 Structure of families (Picard-Lefschetz, monodromy, etc.)
14D06 Fibrations, degenerations
14D07 Variation of Hodge structures [See also 32G20]
14D10 Arithmetic ground fields (finite, local, global)
14D15 Formal methods; deformations [See also 13D10, 14B07, 32Gxx]
14D20 Algebraic moduli problems, moduli of vector bundles {For analytic moduli problems, see 32G13}
14D21 Applications of vector bundles and moduli spaces in mathematical physics (twistor theory, instantons, quantum field theory) [See also 32L25, 81Txx]
14D22 Fine and coarse moduli spaces
14D23 Stacks and moduli problems
14D24 Geometric Langlands program: algebro-geometric aspects [See also 22E57]
14D99 None of the above, but in this section
14Exx **Birational geometry**
14E05 Rational and birational maps
14E07 Birational automorphisms, Cremona group and generalizations
14E08 Rationality questions [See also 14M20]
14E15 Global theory and resolution of singularities [See also 14B05, 32S20, 32S45]
14E16 McKay correspondence
14E18 Arcs and motivic integration
14E20 Coverings [See also 14H30]
14E22 Ramification problems [See also 11S15]
14E25 Embeddings
14E30 Minimal model program (Mori theory, extremal rays)
14E99 None of the above, but in this section
14Fxx **(Co)homology theory [See also 13Dxx]**
14F05 Sheaves, derived categories of sheaves and related constructions [See also 14H60, 14J60, 18F20, 32Lxx, 46M20]
14F10 Differentials and other special sheaves; D-modules; Bernstein-Sato ideals and polynomials [See also 13Nxx, 32C38]
14F17 Vanishing theorems [See also 32L20]
14F18 Multiplier ideals
14F20 Étale and other Grothendieck topologies and (co)homologies
14F22 Brauer groups of schemes [See also 12G05, 16K50]
14F25 Classical real and complex (co)homology
14F30 p-adic cohomology, crystalline cohomology
14F35 Homotopy theory; fundamental groups [See also 14H30]
14F40 de Rham cohomology [See also 14C30, 32C35, 32L10]
14F42 Motivic cohomology; motivic homotopy theory [See also 19E15]
14F43 Other algebro-geometric (co)homologies (e.g., intersection, equivariant, Lawson, Deligne (co)homologies)
14F45 Topological properties
14F99 None of the above, but in this section
14Gxx **Arithmetic problems. Diophantine geometry [See also 11Dxx, 11Gxx]**
14G05 Rational points
14G10 Zeta-functions and related questions [See also 11G40] (Birch-Swinnerton-Dyer conjecture)
14G15 Finite ground fields
14G17 Positive characteristic ground fields
14G20 Local ground fields
14G22 Rigid analytic geometry
14G25 Global ground fields
14G27 Other nonalgebraically closed ground fields
14G32 Universal profinite groups (relationship to moduli spaces, projective and moduli towers, Galois theory)
14G35 Modular and Shimura varieties [See also 11F41, 11F46, 11G18]
14G40 Arithmetic varieties and schemes; Arakelov theory; heights [See also 11G50, 37P30]
14G50 Applications to coding theory and cryptography [See also 94A60, 94B27, 94B40]
14G99 None of the above, but in this section
14Hxx **Curves**
14H05 Algebraic functions; function fields [See also 11R58]
14H10 Families, moduli (algebraic)
14H15 Families, moduli (analytic) [See also 30F10, 32G15]
14H20 Singularities, local rings [See also 13Hxx, 14B05]
14H25 Arithmetic ground fields [See also 11Dxx, 11G05, 14Gxx]
14H30 Coverings, fundamental group [See also 14E20, 14F35]
14H37 Automorphisms
14H40 Jacobians, Prym varieties [See also 32G20]
14H42 Theta functions; Schottky problem [See also 14K25, 32G20]
14H45 Special curves and curves of low genus
14H50 Plane and space curves
14H51 Special divisors (gonality, Brill-Noether theory)
14H52 Elliptic curves [See also 11G05, 11G07, 14Kxx]
14H55 Riemann surfaces; Weierstrass points; gap sequences [See also 30Fxx]
14H57 Dessins d'enfants theory {For arithmetic aspects, see 11G32}
14H60 Vector bundles on curves and their moduli [See also 14D20, 14F05]
14H70 Relationships with integrable systems
14H81 Relationships with physics
14H99 None of the above, but in this section
14Jxx **Surfaces and higher-dimensional varieties {For analytic theory, see 32Jxx}**
14J10 Families, moduli, classification: algebraic theory
14J15 Moduli, classification: analytic theory; relations with modular forms [See also 32G13]
14J17 Singularities [See also 14B05, 14E15]
14J20 Arithmetic ground fields [See also 11Dxx, 11G25, 11G35, 14Gxx]
14J25 Special surfaces {For Hilbert modular surfaces, see 14G35}
14J26 Rational and ruled surfaces
14J27 Elliptic surfaces
14J28 $K3$ surfaces and Enriques surfaces
14J29 Surfaces of general type
14J30 3-folds [See also 32Q25]
14J32 Calabi-Yau manifolds
14J33 Mirror symmetry [See also 11G42, 53D37]
14J35 4-folds
14J40 n-folds ($n > 4$)
14J45 Fano varieties
14J50 Automorphisms of surfaces and higher-dimensional varieties
14J60 Vector bundles on surfaces and higher-dimensional varieties, and their moduli [See also 14D20, 14F05, 32Lxx]
14J70 Hypersurfaces
14J80 Topology of surfaces (Donaldson polynomials, Seiberg-Witten invariants)
14J81 Relationships with physics
14J99 None of the above, but in this section
14Kxx **Abelian varieties and schemes**
14K02 Isogeny
14K05 Algebraic theory
14K10 Algebraic moduli, classification [See also 11G15]
14K12 Subvarieties
14K15 Arithmetic ground fields [See also 11Dxx, 11Fxx, 11G10, 14Gxx]
14K20 Analytic theory; abelian integrals and differentials
14K22 Complex multiplication [See also 11G15]
14K25 Theta functions [See also 14H42]
14K30 Picard schemes, higher Jacobians [See also 14H40, 32G20]
14K99 None of the above, but in this section
14Lxx **Algebraic groups {For linear algebraic groups, see 20Gxx; for Lie algebras, see 17B45}**
14L05 Formal groups, p-divisible groups [See also 55N22]
14L10 Group varieties
14L15 Group schemes
14L17 Affine algebraic groups, hyperalgebra constructions [See also 17B45, 18D35]
14L24 Geometric invariant theory [See also 13A50]
14L30 Group actions on varieties or schemes (quotients) [See also 13A50, 14L24, 14M17]
14L35 Classical groups (geometric aspects) [See also 20Gxx, 51N30]
14L40 Other algebraic groups (geometric aspects)
14L99 None of the above, but in this section
14Mxx **Special varieties**
14M05 Varieties defined by ring conditions (factorial, Cohen-Macaulay, seminormal) [See also 13F15, 13F45, 13H10]
14M06 Linkage [See also 13C40]
14M07 Low codimension problems
14M10 Complete intersections [See also 13C40]
14M12 Determinantal varieties [See also 13C40]
14M15 Grassmannians, Schubert varieties, flag manifolds [See also 32M10, 51M35]

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14M17 Homogeneous spaces and generalizations [See also 32M10, 53C30, 57T15]
14M20 Rational and unirational varieties [See also 14E08]
14M22 Rationally connected varieties
14M25 Toric varieties, Newton polyhedra [See also 52B20]
14M27 Compactifications; symmetric and spherical varieties
14M30 Supervarieties [See also 32C11, 58A50]
14M99 None of the above, but in this section
14Nxx **Projective and enumerative geometry [See also 51–XX]**
14N05 Projective techniques [See also 51N35]
14N10 Enumerative problems (combinatorial problems)
14N15 Classical problems, Schubert calculus
14N20 Configurations and arrangements of linear subspaces
14N25 Varieties of low degree
14N30 Adjunction problems
14N35 Gromov-Witten invariants, quantum cohomology, Gopakumar-Vafa invariants, Donaldson-Thomas invariants [See also 53D45]
14N99 None of the above, but in this section
14Pxx **Real algebraic and real analytic geometry**
14P05 Real algebraic sets [See also 12D15, 13J30]
14P10 Semialgebraic sets and related spaces
14P15 Real analytic and semianalytic sets [See also 32B20, 32C05]
14P20 Nash functions and manifolds [See also 32C07, 58A07]
14P25 Topology of real algebraic varieties
14P99 None of the above, but in this section
14Qxx **Computational aspects in algebraic geometry [See also 12Y05, 13Pxx, 68W30]**
14Q05 Curves
14Q10 Surfaces, hypersurfaces
14Q15 Higher-dimensional varieties
14Q20 Effectivity, complexity
14Q99 None of the above, but in this section
14Rxx **Affine geometry**
14R05 Classification of affine varieties
14R10 Affine spaces (automorphisms, embeddings, exotic structures, cancellation problem)
14R15 Jacobian problem [See also 13F20]
14R20 Group actions on affine varieties [See also 13A50, 14L30]
14R25 Affine fibrations [See also 14D06]
14R99 None of the above, but in this section
14Txx **Tropical geometry [See also 12K10, 14M25, 14N10, 52B20]**
14T05 Tropical geometry [See also 12K10, 14M25, 14N10, 52B20]
14T99 None of the above, but in this section

15-XX **LINEAR AND MULTILINEAR ALGEBRA; MATRIX THEORY**
15-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
15-01 Instructional exposition (textbooks, tutorial papers, etc.)
15-02 Research exposition (monographs, survey articles)
15-03 Historical (must also be assigned at least one classification number from Section 01)
15-04 Explicit machine computation and programs (not the theory of computation or programming)
15-06 Proceedings, conferences, collections, etc.
15Axx **Basic linear algebra**
15A03 Vector spaces, linear dependence, rank
15A04 Linear transformations, semilinear transformations
15A06 Linear equations
15A09 Matrix inversion, generalized inverses
15A12 Conditioning of matrices [See also 65F35]
15A15 Determinants, permanents, other special matrix functions [See also 19B10, 19B14]
15A16 Matrix exponential and similar functions of matrices
15A18 Eigenvalues, singular values, and eigenvectors
15A21 Canonical forms, reductions, classification
15A22 Matrix pencils [See also 47A56]
15A23 Factorization of matrices
15A24 Matrix equations and identities
15A27 Commutativity
15A29 Inverse problems
15A30 Algebraic systems of matrices [See also 16S50, 20Gxx, 20Hxx]
15A39 Linear inequalities
15A42 Inequalities involving eigenvalues and eigenvectors
15A45 Miscellaneous inequalities involving matrices
15A54 Matrices over function rings in one or more variables
15A60 Norms of matrices, numerical range, applications of functional analysis to matrix theory [See also 65F35, 65J05]
15A63 Quadratic and bilinear forms, inner products [See mainly 11Exx]
15A66 Clifford algebras, spinors
15A69 Multilinear algebra, tensor products
15A72 Vector and tensor algebra, theory of invariants [See also 13A50, 14L24]
15A75 Exterior algebra, Grassmann algebras
15A78 Other algebras built from modules
15A80 Max-plus and related algebras
15A83 Matrix completion problems
15A86 Linear preserver problems
15A99 Miscellaneous topics
15Bxx **Special matrices**
15B05 Toeplitz, Cauchy, and related matrices
15B10 Orthogonal matrices
15B15 Fuzzy matrices
15B33 Matrices over special rings (quaternions, finite fields, etc.)
15B34 Boolean and Hadamard matrices
15B35 Sign pattern matrices
15B36 Matrices of integers [See also 11C20]
15B48 Positive matrices and their generalizations; cones of matrices
15B51 Stochastic matrices
15B52 Random matrices
15B57 Hermitian, skew-Hermitian, and related matrices
15B99 None of the above, but in this section

16-XX **ASSOCIATIVE RINGS AND ALGEBRAS {For the commutative case, see 13-XX}**
16-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
16-01 Instructional exposition (textbooks, tutorial papers, etc.)
16-02 Research exposition (monographs, survey articles)
16-03 Historical (must also be assigned at least one classification number from Section 01)
16-04 Explicit machine computation and programs (not the theory of computation or programming)
16-06 Proceedings, conferences, collections, etc.
16Bxx **General and miscellaneous**
16B50 Category-theoretic methods and results (except as in 16D90) [See also 18–XX]
16B70 Applications of logic [See also 03Cxx]
16B99 None of the above, but in this section
16Dxx **Modules, bimodules and ideals**
16D10 General module theory
16D20 Bimodules
16D25 Ideals
16D30 Infinite-dimensional simple rings (except as in 16Kxx)
16D40 Free, projective, and flat modules and ideals [See also 19A13]
16D50 Injective modules, self-injective rings [See also 16L60]
16D60 Simple and semisimple modules, primitive rings and ideals
16D70 Structure and classification (except as in 16Gxx), direct sum decomposition, cancellation
16D80 Other classes of modules and ideals [See also 16G50]
16D90 Module categories [See also 16Gxx, 16S90]; module theory in a category-theoretic context; Morita equivalence and duality
16D99 None of the above, but in this section
16Exx **Homological methods {For commutative rings, see 13Dxx; for general categories, see 18Gxx}**
16E05 Syzygies, resolutions, complexes
16E10 Homological dimension
16E20 Grothendieck groups, K-theory, etc. [See also 18F30, 19Axx, 19D50]
16E30 Homological functors on modules (Tor, Ext, etc.)
16E35 Derived categories
16E40 (Co)homology of rings and algebras (e.g. Hochschild, cyclic, dihedral, etc.)
16E45 Differential graded algebras and applications
16E50 von Neumann regular rings and generalizations
16E60 Semihereditary and hereditary rings, free ideal rings, Sylvester rings, etc.
16E65 Homological conditions on rings (generalizations of regular, Gorenstein, Cohen-Macaulay rings, etc.)
16E99 None of the above, but in this section
16Gxx **Representation theory of rings and algebras**
16G10 Representations of Artinian rings
16G20 Representations of quivers and partially ordered sets
16G30 Representations of orders, lattices, algebras over commutative rings [See also 16Hxx]
16G50 Cohen-Macaulay modules
16G60 Representation type (finite, tame, wild, etc.)
16G70 Auslander-Reiten sequences (almost split sequences) and Auslander-Reiten quivers
16G99 None of the above, but in this section

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16Hxx **Algebras and orders {For arithmetic aspects, see 11R52, 11R54, 11S45; for representation theory, see 16G30}**
16H05 Separable algebras (e.g., quaternion algebras, Azumaya algebras, etc.)
16H10 Orders in separable algebras
16H15 Commutative orders
16H20 Lattices over orders
16H99 None of the above, but in this section
16Kxx **Division rings and semisimple Artin rings [See also 12E15, 15A30]**
16K20 Finite-dimensional {For crossed products, see 16S35}
16K40 Infinite-dimensional and general
16K50 Brauer groups [See also 12G05, 14F22]
16K99 None of the above, but in this section
16Lxx **Local rings and generalizations**
16L30 Noncommutative local and semilocal rings, perfect rings
16L60 Quasi-Frobenius rings [See also 16D50]
16L99 None of the above, but in this section
16Nxx **Radicals and radical properties of rings**
16N20 Jacobson radical, quasimultiplication
16N40 Nil and nilpotent radicals, sets, ideals, rings
16N60 Prime and semiprime rings [See also 16D60, 16U10]
16N80 General radicals and rings {For radicals in module categories, see 16S90}
16N99 None of the above, but in this section
16Pxx **Chain conditions, growth conditions, and other forms of finiteness**
16P10 Finite rings and finite-dimensional algebras {For semisimple, see 16K20; for commutative, see 11Txx, 13Mxx}
16P20 Artinian rings and modules
16P40 Noetherian rings and modules
16P50 Localization and Noetherian rings [See also 16U20]
16P60 Chain conditions on annihilators and summands: Goldie-type conditions [See also 16U20], Krull dimension
16P70 Chain conditions on other classes of submodules, ideals, subrings, etc.; coherence
16P90 Growth rate, Gelfand-Kirillov dimension
16P99 None of the above, but in this section
16Rxx **Rings with polynomial identity**
16R10 T-ideals, identities, varieties of rings and algebras
16R20 Semiprime p.i. rings, rings embeddable in matrices over commutative rings
16R30 Trace rings and invariant theory
16R40 Identities other than those of matrices over commutative rings
16R50 Other kinds of identities (generalized polynomial, rational, involution)
16R60 Functional identities
16R99 None of the above, but in this section
16Sxx **Rings and algebras arising under various constructions**
16S10 Rings determined by universal properties (free algebras, coproducts, adjunction of inverses, etc.)
16S15 Finite generation, finite presentability, normal forms (diamond lemma, term-rewriting)
16S20 Centralizing and normalizing extensions
16S30 Universal enveloping algebras of Lie algebras [See mainly 17B35]
16S32 Rings of differential operators [See also 13N10, 32C38]
16S34 Group rings [See also 20C05, 20C07], Laurent polynomial rings
16S35 Twisted and skew group rings, crossed products
16S36 Ordinary and skew polynomial rings and semigroup rings [See also 20M25]
16S37 Quadratic and Koszul algebras
16S38 Rings arising from non-commutative algebraic geometry [See also 14A22]
16S40 Smash products of general Hopf actions [See also 16T05]
16S50 Endomorphism rings; matrix rings [See also 15–XX]
16S60 Rings of functions, subdirect products, sheaves of rings
16S70 Extensions of rings by ideals
16S80 Deformations of rings [See also 13D10, 14D15]
16S85 Rings of fractions and localizations [See also 13B30]
16S90 Torsion theories; radicals on module categories [See also 13D30, 18E40] {For radicals of rings, see 16Nxx}
16S99 None of the above, but in this section
16Txx **Hopf algebras, quantum groups and related topics**
16T05 Hopf algebras and their applications [See also 16S40, 57T05]
16T10 Bialgebras
16T15 Coalgebras and comodules; corings
16T20 Ring-theoretic aspects of quantum groups [See also 17B37, 20G42, 81R50]
16T25 Yang-Baxter equations
16T30 Connections with combinatorics
16T99 None of the above, but in this section
16Uxx **Conditions on elements**
16U10 Integral domains
16U20 Ore rings, multiplicative sets, Ore localization
16U30 Divisibility, noncommutative UFDs
16U60 Units, groups of units
16U70 Center, normalizer (invariant elements)
16U80 Generalizations of commutativity
16U99 None of the above, but in this section
16Wxx **Rings and algebras with additional structure**
16W10 Rings with involution; Lie, Jordan and other nonassociative structures [See also 17B60, 17C50, 46Kxx]
16W20 Automorphisms and endomorphisms
16W22 Actions of groups and semigroups; invariant theory
16W25 Derivations, actions of Lie algebras
16W50 Graded rings and modules
16W55 "Super" (or "skew") structure [See also 17A70, 17Bxx, 17C70] {For exterior algebras, see 15A75; for Clifford algebras, see 11E88, 15A66}
16W60 Valuations, completions, formal power series and related constructions [See also 13Jxx]
16W70 Filtered rings; filtrational and graded techniques
16W80 Topological and ordered rings and modules [See also 06F25, 13Jxx]
16W99 None of the above, but in this section
16Yxx **Generalizations {For nonassociative rings, see 17–XX}**
16Y30 Near-rings [See also 12K05]
16Y60 Semirings [See also 12K10]
16Y99 None of the above, but in this section
16Zxx **Computational aspects of associative rings**
16Z05 Computational aspects of associative rings [See also 68W30]
16Z99 None of the above, but in this section

17-XX **NONASSOCIATIVE RINGS AND ALGEBRAS**
17-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
17-01 Instructional exposition (textbooks, tutorial papers, etc.)
17-02 Research exposition (monographs, survey articles)
17-03 Historical (must also be assigned at least one classification number from Section 01)
17-04 Explicit machine computation and programs (not the theory of computation or programming)
17-06 Proceedings, conferences, collections, etc.
17-08 Computational methods
17Axx **General nonassociative rings**
17A01 General theory
17A05 Power-associative rings
17A15 Noncommutative Jordan algebras
17A20 Flexible algebras
17A30 Algebras satisfying other identities
17A32 Leibniz algebras
17A35 Division algebras
17A36 Automorphisms, derivations, other operators
17A40 Ternary compositions
17A42 Other n-ary compositions ($n \geq 3$)
17A45 Quadratic algebras (but not quadratic Jordan algebras)
17A50 Free algebras
17A60 Structure theory
17A65 Radical theory
17A70 Superalgebras
17A75 Composition algebras
17A80 Valued algebras
17A99 None of the above, but in this section
17Bxx **Lie algebras and Lie superalgebras {For Lie groups, see 22Exx}**
17B01 Identities, free Lie (super)algebras
17B05 Structure theory
17B08 Coadjoint orbits; nilpotent varieties
17B10 Representations, algebraic theory (weights)
17B15 Representations, analytic theory
17B20 Simple, semisimple, reductive (super)algebras
17B22 Root systems
17B25 Exceptional (super)algebras
17B30 Solvable, nilpotent (super)algebras
17B35 Universal enveloping (super)algebras [See also 16S30]
17B37 Quantum groups (quantized enveloping algebras) and related deformations [See also 16T20, 20G42, 81R50, 82B23]
17B40 Automorphisms, derivations, other operators
17B45 Lie algebras of linear algebraic groups [See also 14Lxx and 20Gxx]
17B50 Modular Lie (super)algebras
17B55 Homological methods in Lie (super)algebras
17B56 Cohomology of Lie (super)algebras
17B60 Lie (super)algebras associated with other structures (associative, Jordan, etc.) [See also 16W10, 17C40, 17C50]
17B62 Lie bialgebras; Lie coalgebras

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17B63 Poisson algebras
17B65 Infinite-dimensional Lie (super)algebras [See also 22E65]
17B66 Lie algebras of vector fields and related (super) algebras
17B67 Kac-Moody (super)algebras; extended affine Lie algebras; toroidal Lie algebras
17B68 Virasoro and related algebras
17B69 Vertex operators; vertex operator algebras and related structures
17B70 Graded Lie (super)algebras
17B75 Color Lie (super)algebras
17B80 Applications to integrable systems
17B81 Applications to physics
17B99 None of the above, but in this section

17Cxx **Jordan algebras (algebras, triples and pairs)**
17C05 Identities and free Jordan structures
17C10 Structure theory
17C17 Radicals
17C20 Simple, semisimple algebras
17C27 Idempotents, Peirce decompositions
17C30 Associated groups, automorphisms
17C36 Associated manifolds
17C37 Associated geometries
17C40 Exceptional Jordan structures
17C50 Jordan structures associated with other structures [See also 16W10]
17C55 Finite-dimensional structures
17C60 Division algebras
17C65 Jordan structures on Banach spaces and algebras [See also 46H70, 46L70]
17C70 Super structures
17C90 Applications to physics
17C99 None of the above, but in this section

17Dxx **Other nonassociative rings and algebras**
17D05 Alternative rings
17D10 Mal′cev (Mal′tsev) rings and algebras
17D15 Right alternative rings
17D20 (γ, δ)-rings, including $(1, -1)$-rings
17D25 Lie-admissible algebras
17D92 Genetic algebras
17D99 None of the above, but in this section

18-XX CATEGORY THEORY; HOMOLOGICAL ALGEBRA {For commutative rings see 13Dxx, for associative rings 16Exx, for groups 20Jxx, for topological groups and related structures 57Txx; see also 55Nxx and 55Uxx for algebraic topology}

18-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
18-01 Instructional exposition (textbooks, tutorial papers, etc.)
18-02 Research exposition (monographs, survey articles)
18-03 Historical (must also be assigned at least one classification number from Section 01)
18-04 Explicit machine computation and programs (not the theory of computation or programming)
18-06 Proceedings, conferences, collections, etc.

18Axx **General theory of categories and functors**
18A05 Definitions, generalizations
18A10 Graphs, diagram schemes, precategories [See especially 20L05]
18A15 Foundations, relations to logic and deductive systems [See also 03–XX]
18A20 Epimorphisms, monomorphisms, special classes of morphisms, null morphisms
18A22 Special properties of functors (faithful, full, etc.)
18A23 Natural morphisms, dinatural morphisms
18A25 Functor categories, comma categories
18A30 Limits and colimits (products, sums, directed limits, pushouts, fiber products, equalizers, kernels, ends and coends, etc.)
18A32 Factorization of morphisms, substructures, quotient structures, congruences, amalgams
18A35 Categories admitting limits (complete categories), functors preserving limits, completions
18A40 Adjoint functors (universal constructions, reflective subcategories, Kan extensions, etc.)
18A99 None of the above, but in this section

18Bxx **Special categories**
18B05 Category of sets, characterizations [See also 03–XX]
18B10 Category of relations, additive relations
18B15 Embedding theorems, universal categories [See also 18E20]
18B20 Categories of machines, automata, operative categories [See also 03D05, 68Qxx]
18B25 Topoi [See also 03G30]
18B30 Categories of topological spaces and continuous mappings [See also 54–XX]
18B35 Preorders, orders and lattices (viewed as categories) [See also 06–XX]
18B40 Groupoids, semigroupoids, semigroups, groups (viewed as categories) [See also 20Axx, 20L05, 20Mxx]
18B99 None of the above, but in this section

18Cxx **Categories and theories**
18C05 Equational categories [See also 03C05, 08C05]
18C10 Theories (e.g. algebraic theories), structure, and semantics [See also 03G30]
18C15 Triples (= standard construction, monad or triad), algebras for a triple, homology and derived functors for triples [See also 18Gxx]
18C20 Algebras and Kleisli categories associated with monads
18C30 Sketches and generalizations
18C35 Accessible and locally presentable categories
18C50 Categorical semantics of formal languages [See also 68Q55, 68Q65]
18C99 None of the above, but in this section

18Dxx **Categories with structure**
18D05 Double categories, 2-categories, bicategories and generalizations
18D10 Monoidal categories (= multiplicative categories), symmetric monoidal categories, braided categories [See also 19D23]
18D15 Closed categories (closed monoidal and Cartesian closed categories, etc.)
18D20 Enriched categories (over closed or monoidal categories)
18D25 Strong functors, strong adjunctions
18D30 Fibered categories
18D35 Structured objects in a category (group objects, etc.)
18D50 Operads [See also 55P48]
18D99 None of the above, but in this section

18Exx **Abelian categories**
18E05 Preadditive, additive categories
18E10 Exact categories, abelian categories
18E15 Grothendieck categories
18E20 Embedding theorems [See also 18B15]
18E25 Derived functors and satellites
18E30 Derived categories, triangulated categories
18E35 Localization of categories
18E40 Torsion theories, radicals [See also 13D30, 16S90]
18E99 None of the above, but in this section

18Fxx **Categories and geometry**
18F05 Local categories and functors
18F10 Grothendieck topologies [See also 14F20]
18F15 Abstract manifolds and fiber bundles [See also 55Rxx, 57Pxx]
18F20 Presheaves and sheaves [See also 14F05, 32C35, 32L10, 54B40, 55N30]
18F25 Algebraic K-theory and L-theory [See also 11Exx, 11R70, 11S70, 12–XX, 13D15, 14Cxx, 16E20, 19–XX, 46L80, 57R65, 57R67]
18F30 Grothendieck groups [See also 13D15, 16E20, 19Axx]
18F99 None of the above, but in this section

18Gxx **Homological algebra [See also 13Dxx, 16Exx, 20Jxx, 55Nxx, 55Uxx, 57Txx]**
18G05 Projectives and injectives [See also 13C10, 13C11, 16D40, 16D50]
18G10 Resolutions; derived functors [See also 13D02, 16E05, 18E25]
18G15 Ext and Tor, generalizations, Künneth formula [See also 55U25]
18G20 Homological dimension [See also 13D05, 16E10]
18G25 Relative homological algebra, projective classes
18G30 Simplicial sets, simplicial objects (in a category) [See also 55U10]
18G35 Chain complexes [See also 18E30, 55U15]
18G40 Spectral sequences, hypercohomology [See also 55Txx]
18G50 Nonabelian homological algebra
18G55 Homotopical algebra
18G60 Other (co)homology theories [See also 19D55, 46L80, 58J20, 58J22]
18G99 None of the above, but in this section

19-XX K-THEORY [See also 16E20, 18F25]

19-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
19-01 Instructional exposition (textbooks, tutorial papers, etc.)
19-02 Research exposition (monographs, survey articles)
19-03 Historical (must also be assigned at least one classification number from Section 01)
19-04 Explicit machine computation and programs (not the theory of computation or programming)
19-06 Proceedings, conferences, collections, etc.

19Axx **Grothendieck groups and K_0 [See also 13D15, 18F30]**
19A13 Stability for projective modules [See also 13C10]
19A15 Efficient generation
19A22 Frobenius induction, Burnside and representation rings
19A31 K_0 of group rings and orders
19A49 K_0 of other rings
19A99 None of the above, but in this section

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19Bxx **Whitehead groups and K_1**
19B10 Stable range conditions
19B14 Stability for linear groups
19B28 K_1 of group rings and orders [See also 57Q10]
19B37 Congruence subgroup problems [See also 20H05]
19B99 None of the above, but in this section
19Cxx **Steinberg groups and K_2**
19C09 Central extensions and Schur multipliers
19C20 Symbols, presentations and stability of K_2
19C30 K_2 and the Brauer group
19C40 Excision for K_2
19C99 None of the above, but in this section
19Dxx **Higher algebraic K-theory**
19D06 Q- and plus-constructions
19D10 Algebraic K-theory of spaces
19D23 Symmetric monoidal categories [See also 18D10]
19D25 Karoubi-Villamayor-Gersten K-theory
19D35 Negative K-theory, NK and Nil
19D45 Higher symbols, Milnor K-theory
19D50 Computations of higher K-theory of rings [See also 13D15, 16E20]
19D55 K-theory and homology; cyclic homology and cohomology [See also 18G60]
19D99 None of the above, but in this section
19Exx **K-theory in geometry**
19E08 K-theory of schemes [See also 14C35]
19E15 Algebraic cycles and motivic cohomology [See also 14C25, 14C35, 14F42]
19E20 Relations with cohomology theories [See also 14Fxx]
19E99 None of the above, but in this section
19Fxx **K-theory in number theory [See also 11R70, 11S70]**
19F05 Generalized class field theory [See also 11G45]
19F15 Symbols and arithmetic [See also 11R37]
19F27 Étale cohomology, higher regulators, zeta and L-functions [See also 11G40, 11R42, 11S40, 14F20, 14G10]
19F99 None of the above, but in this section
19Gxx **K-theory of forms [See also 11Exx]**
19G05 Stability for quadratic modules
19G12 Witt groups of rings [See also 11E81]
19G24 L-theory of group rings [See also 11E81]
19G38 Hermitian K-theory, relations with K-theory of rings
19G99 None of the above, but in this section
19Jxx **Obstructions from topology**
19J05 Finiteness and other obstructions in K_0
19J10 Whitehead (and related) torsion
19J25 Surgery obstructions [See also 57R67]
19J35 Obstructions to group actions
19J99 None of the above, but in this section
19Kxx **K-theory and operator algebras [See mainly 46L80, and also 46M20]**
19K14 K_0 as an ordered group, traces
19K33 EXT and K-homology [See also 55N22]
19K35 Kasparov theory (KK-theory) [See also 58J22]
19K56 Index theory [See also 58J20, 58J22]
19K99 None of the above, but in this section
19Lxx **Topological K-theory [See also 55N15, 55R50, 55S25]**
19L10 Riemann-Roch theorems, Chern characters
19L20 J-homomorphism, Adams operations [See also 55Q50]
19L41 Connective K-theory, cobordism [See also 55N22]
19L47 Equivariant K-theory [See also 55N91, 55P91, 55Q91, 55R91, 55S91]
19L50 Twisted K-theory; differential K-theory
19L64 Computations, geometric applications
19L99 None of the above, but in this section
19Mxx **Miscellaneous applications of K-theory**
19M05 Miscellaneous applications of K-theory
19M99 None of the above, but in this section

20-XX **GROUP THEORY AND GENERALIZATIONS**
20-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
20-01 Instructional exposition (textbooks, tutorial papers, etc.)
20-02 Research exposition (monographs, survey articles)
20-03 Historical (must also be assigned at least one classification number from Section 01)
20-04 Explicit machine computation and programs (not the theory of computation or programming)
20-06 Proceedings, conferences, collections, etc.
20Axx **Foundations**
20A05 Axiomatics and elementary properties
20A10 Metamathematical considerations {For word problems, see 20F10}
20A15 Applications of logic to group theory
20A99 None of the above, but in this section
20Bxx **Permutation groups**
20B05 General theory for finite groups
20B07 General theory for infinite groups
20B10 Characterization theorems
20B15 Primitive groups
20B20 Multiply transitive finite groups
20B22 Multiply transitive infinite groups
20B25 Finite automorphism groups of algebraic, geometric, or combinatorial structures [See also 05Bxx, 12F10, 20G40, 20H30, 51–XX]
20B27 Infinite automorphism groups [See also 12F10]
20B30 Symmetric groups
20B35 Subgroups of symmetric groups
20B40 Computational methods
20B99 None of the above, but in this section
20Cxx **Representation theory of groups [See also 19A22 (for representation rings and Burnside rings)]**
20C05 Group rings of finite groups and their modules [See also 16S34]
20C07 Group rings of infinite groups and their modules [See also 16S34]
20C08 Hecke algebras and their representations
20C10 Integral representations of finite groups
20C11 p-adic representations of finite groups
20C12 Integral representations of infinite groups
20C15 Ordinary representations and characters
20C20 Modular representations and characters
20C25 Projective representations and multipliers
20C30 Representations of finite symmetric groups
20C32 Representations of infinite symmetric groups
20C33 Representations of finite groups of Lie type
20C34 Representations of sporadic groups
20C35 Applications of group representations to physics
20C40 Computational methods
20C99 None of the above, but in this section
20Dxx **Abstract finite groups**
20D05 Finite simple groups and their classification
20D06 Simple groups: alternating groups and groups of Lie type [See also 20Gxx]
20D08 Simple groups: sporadic groups
20D10 Solvable groups, theory of formations, Schunck classes, Fitting classes, π-length, ranks [See also 20F17]
20D15 Nilpotent groups, p-groups
20D20 Sylow subgroups, Sylow properties, π-groups, π-structure
20D25 Special subgroups (Frattini, Fitting, etc.)
20D30 Series and lattices of subgroups
20D35 Subnormal subgroups
20D40 Products of subgroups
20D45 Automorphisms
20D60 Arithmetic and combinatorial problems
20D99 None of the above, but in this section
20Exx **Structure and classification of infinite or finite groups**
20E05 Free nonabelian groups
20E06 Free products, free products with amalgamation, Higman-Neumann-Neumann extensions, and generalizations
20E07 Subgroup theorems; subgroup growth
20E08 Groups acting on trees [See also 20F65]
20E10 Quasivarieties and varieties of groups
20E15 Chains and lattices of subgroups, subnormal subgroups [See also 20F22]
20E18 Limits, profinite groups
20E22 Extensions, wreath products, and other compositions [See also 20J05]
20E25 Local properties
20E26 Residual properties and generalizations; residually finite groups
20E28 Maximal subgroups
20E32 Simple groups [See also 20D05]
20E34 General structure theorems
20E36 Automorphisms of infinite groups [For automorphisms of finite groups, see 20D45]
20E42 Groups with a BN-pair; buildings [See also 51E24]
20E45 Conjugacy classes
20E99 None of the above, but in this section
20Fxx **Special aspects of infinite or finite groups**
20F05 Generators, relations, and presentations
20F06 Cancellation theory; application of van Kampen diagrams [See also 57M05]
20F10 Word problems, other decision problems, connections with logic and automata [See also 03B25, 03D05, 03D40, 06B25, 08A50, 20M05, 68Q70]
20F11 Groups of finite Morley rank [See also 03C45, 03C60]
20F12 Commutator calculus
20F14 Derived series, central series, and generalizations
20F16 Solvable groups, supersolvable groups [See also 20D10]

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20F17 Formations of groups, Fitting classes [See also 20D10]
20F18 Nilpotent groups [See also 20D15]
20F19 Generalizations of solvable and nilpotent groups
20F22 Other classes of groups defined by subgroup chains
20F24 FC-groups and their generalizations
20F28 Automorphism groups of groups [See also 20E36]
20F29 Representations of groups as automorphism groups of algebraic systems
20F34 Fundamental groups and their automorphisms [See also 57M05, 57Sxx]
20F36 Braid groups; Artin groups
20F38 Other groups related to topology or analysis
20F40 Associated Lie structures
20F45 Engel conditions
20F50 Periodic groups; locally finite groups
20F55 Reflection and Coxeter groups [See also 22E40, 51F15]
20F60 Ordered groups [See mainly 06F15]
20F65 Geometric group theory [See also 05C25, 20E08, 57Mxx]
20F67 Hyperbolic groups and nonpositively curved groups
20F69 Asymptotic properties of groups
20F70 Algebraic geometry over groups; equations over groups
20F99 None of the above, but in this section

20Gxx **Linear algebraic groups and related topics {For arithmetic theory, see 11E57, 11H56; for geometric theory, see 14Lxx, 22Exx; for other methods in representation theory, see 15A30, 22E45, 22E46, 22E47, 22E50, 22E55}**
20G05 Representation theory
20G07 Structure theory
20G10 Cohomology theory
20G15 Linear algebraic groups over arbitrary fields
20G20 Linear algebraic groups over the reals, the complexes, the quaternions
20G25 Linear algebraic groups over local fields and their integers
20G30 Linear algebraic groups over global fields and their integers
20G35 Linear algebraic groups over adèles and other rings and schemes
20G40 Linear algebraic groups over finite fields
20G41 Exceptional groups
20G42 Quantum groups (quantized function algebras) and their representations [See also 16T20, 17B37, 81R50]
20G43 Schur and q-Schur algebras
20G44 Kac-Moody groups
20G45 Applications to physics
20G99 None of the above, but in this section

20Hxx **Other groups of matrices [See also 15A30]**
20H05 Unimodular groups, congruence subgroups [See also 11F06, 19B37, 22E40, 51F20]
20H10 Fuchsian groups and their generalizations [See also 11F06, 22E40, 30F35, 32Nxx]
20H15 Other geometric groups, including crystallographic groups [See also 51–XX, especially 51F15, and 82D25]
20H20 Other matrix groups over fields
20H25 Other matrix groups over rings
20H30 Other matrix groups over finite fields
20H99 None of the above, but in this section

20Jxx **Connections with homological algebra and category theory**
20J05 Homological methods in group theory
20J06 Cohomology of groups
20J15 Category of groups
20J99 None of the above, but in this section

20Kxx **Abelian groups**
20K01 Finite abelian groups [For sumsets, see 11B13 and 11P70]
20K10 Torsion groups, primary groups and generalized primary groups
20K15 Torsion-free groups, finite rank
20K20 Torsion-free groups, infinite rank
20K21 Mixed groups
20K25 Direct sums, direct products, etc.
20K27 Subgroups
20K30 Automorphisms, homomorphisms, endomorphisms, etc.
20K35 Extensions
20K40 Homological and categorical methods
20K45 Topological methods [See also 22A05, 22B05]
20K99 None of the above, but in this section

20Lxx **Groupoids (i.e. small categories in which all morphisms are isomorphisms) {For sets with a single binary operation, see 20N02; for topological groupoids, see 22A22, 58H05}**
20L05 Groupoids (i.e. small categories in which all morphisms are isomorphisms) {For sets with a single binary operation, see 20N02; for topological groupoids, see 22A22, 58H05}
20L99 None of the above, but in this section

20Mxx **Semigroups**
20M05 Free semigroups, generators and relations, word problems [See also 03D40, 08A50, 20F10]
20M07 Varieties and pseudovarieties of semigroups
20M10 General structure theory
20M11 Radical theory
20M12 Ideal theory
20M13 Arithmetic theory of monoids
20M14 Commutative semigroups
20M15 Mappings of semigroups
20M17 Regular semigroups
20M18 Inverse semigroups
20M19 Orthodox semigroups
20M20 Semigroups of transformations, etc. [See also 47D03, 47H20, 54H15]
20M25 Semigroup rings, multiplicative semigroups of rings [See also 16S36, 16Y60]
20M30 Representation of semigroups; actions of semigroups on sets
20M32 Algebraic monoids
20M35 Semigroups in automata theory, linguistics, etc. [See also 03D05, 68Q70, 68T50]
20M50 Connections of semigroups with homological algebra and category theory
20M99 None of the above, but in this section

20Nxx **Other generalizations of groups**
20N02 Sets with a single binary operation (groupoids)
20N05 Loops, quasigroups [See also 05Bxx]
20N10 Ternary systems (heaps, semiheaps, heapoids, etc.)
20N15 n-ary systems ($n \geq 3$)
20N20 Hypergroups
20N25 Fuzzy groups [See also 03E72]
20N99 None of the above, but in this section

20Pxx **Probabilistic methods in group theory [See also 60Bxx]**
20P05 Probabilistic methods in group theory [See also 60Bxx]
20P99 None of the above, but in this section

22-XX **TOPOLOGICAL GROUPS, LIE GROUPS {For transformation groups, see 54H15, 57Sxx, 58-XX. For abstract harmonic analysis, see 43-XX}**
22-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
22-01 Instructional exposition (textbooks, tutorial papers, etc.)
22-02 Research exposition (monographs, survey articles)
22-03 Historical (must also be assigned at least one classification number from Section 01)
22-04 Explicit machine computation and programs (not the theory of computation or programming)
22-06 Proceedings, conferences, collections, etc.

22Axx **Topological and differentiable algebraic systems {For topological rings and fields, see 12Jxx, 13Jxx, 16W80}**
22A05 Structure of general topological groups
22A10 Analysis on general topological groups
22A15 Structure of topological semigroups
22A20 Analysis on topological semigroups
22A22 Topological groupoids (including differentiable and Lie groupoids) [See also 58H05]
22A25 Representations of general topological groups and semigroups
22A26 Topological semilattices, lattices and applications [See also 06B30, 06B35, 06F30]
22A30 Other topological algebraic systems and their representations
22A99 None of the above, but in this section

22Bxx **Locally compact abelian groups (LCA groups)**
22B05 General properties and structure of LCA groups
22B10 Structure of group algebras of LCA groups
22B99 None of the above, but in this section

22Cxx **Compact groups**
22C05 Compact groups
22C99 None of the above, but in this section

22Dxx **Locally compact groups and their algebras**
22D05 General properties and structure of locally compact groups
22D10 Unitary representations of locally compact groups
22D12 Other representations of locally compact groups
22D15 Group algebras of locally compact groups
22D20 Representations of group algebras
22D25 C^*-algebras and W^*-algebras in relation to group representations [See also 46Lxx]
22D30 Induced representations
22D35 Duality theorems
22D40 Ergodic theory on groups [See also 28Dxx]
22D45 Automorphism groups of locally compact groups
22D99 None of the above, but in this section

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22Exx **Lie groups {For the topology of Lie groups and homogeneous spaces, see 57Sxx, 57Txx; for analysis thereon, see 43A80, 43A85, 43A90}**
22E05 Local Lie groups [See also 34–XX, 35–XX, 58H05]
22E10 General properties and structure of complex Lie groups [See also 32M05]
22E15 General properties and structure of real Lie groups
22E20 General properties and structure of other Lie groups
22E25 Nilpotent and solvable Lie groups
22E27 Representations of nilpotent and solvable Lie groups (special orbital integrals, non-type I representations, etc.)
22E30 Analysis on real and complex Lie groups [See also 33C80, 43–XX]
22E35 Analysis on p-adic Lie groups
22E40 Discrete subgroups of Lie groups [See also 20Hxx, 32Nxx]
22E41 Continuous cohomology [See also 57R32, 57Txx, 58H10]
22E43 Structure and representation of the Lorentz group
22E45 Representations of Lie and linear algebraic groups over real fields: analytic methods {For the purely algebraic theory, see 20G05}
22E46 Semisimple Lie groups and their representations
22E47 Representations of Lie and real algebraic groups: algebraic methods (Verma modules, etc.) [See also 17B10]
22E50 Representations of Lie and linear algebraic groups over local fields [See also 20G05]
22E55 Representations of Lie and linear algebraic groups over global fields and adèle rings [See also 20G05]
22E57 Geometric Langlands program: representation-theoretic aspects [See also 14D24]
22E60 Lie algebras of Lie groups {For the algebraic theory of Lie algebras, see 17Bxx}
22E65 Infinite-dimensional Lie groups and their Lie algebras: general properties [See also 17B65, 58B25, 58H05]
22E66 Analysis on and representations of infinite-dimensional Lie groups
22E67 Loop groups and related constructions, group-theoretic treatment [See also 58D05]
22E70 Applications of Lie groups to physics; explicit representations [See also 81R05, 81R10]
22E99 None of the above, but in this section
22Fxx **Noncompact transformation groups**
22F05 General theory of group and pseudogroup actions {For topological properties of spaces with an action, see 57S20}
22F10 Measurable group actions [See also 22D40, 28Dxx, 37Axx]
22F30 Homogeneous spaces {For general actions on manifolds or preserving geometrical structures, see 57M60, 57Sxx; for discrete subgroups of Lie groups, see especially 22E40}
22F50 Groups as automorphisms of other structures
22F99 None of the above, but in this section

26-XX **REAL FUNCTIONS [See also 54C30]**
26-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
26-01 Instructional exposition (textbooks, tutorial papers, etc.)
26-02 Research exposition (monographs, survey articles)
26-03 Historical (must also be assigned at least one classification number from Section 01)
26-04 Explicit machine computation and programs (not the theory of computation or programming)
26-06 Proceedings, conferences, collections, etc.
26Axx **Functions of one variable**
26A03 Foundations: limits and generalizations, elementary topology of the line
26A06 One-variable calculus
26A09 Elementary functions
26A12 Rate of growth of functions, orders of infinity, slowly varying functions [See also 26A48]
26A15 Continuity and related questions (modulus of continuity, semicontinuity, discontinuities, etc.) {For properties determined by Fourier coefficients, see 42A16; for those determined by approximation properties, see 41A25, 41A27}
26A16 Lipschitz (Hölder) classes
26A18 Iteration [See also 37Bxx, 37Cxx, 37Exx, 39B12, 47H10, 54H25]
26A21 Classification of real functions; Baire classification of sets and functions [See also 03E15, 28A05, 54C50, 54H05]
26A24 Differentiation (functions of one variable): general theory, generalized derivatives, mean-value theorems [See also 28A15]
26A27 Nondifferentiability (nondifferentiable functions, points of nondifferentiability), discontinuous derivatives
26A30 Singular functions, Cantor functions, functions with other special properties
26A33 Fractional derivatives and integrals
26A36 Antidifferentiation
26A39 Denjoy and Perron integrals, other special integrals
26A42 Integrals of Riemann, Stieltjes and Lebesgue type [See also 28–XX]
26A45 Functions of bounded variation, generalizations
26A46 Absolutely continuous functions
26A48 Monotonic functions, generalizations
26A51 Convexity, generalizations
26A99 None of the above, but in this section
26Bxx **Functions of several variables**
26B05 Continuity and differentiation questions
26B10 Implicit function theorems, Jacobians, transformations with several variables
26B12 Calculus of vector functions
26B15 Integration: length, area, volume [See also 28A75, 51M25]
26B20 Integral formulas (Stokes, Gauss, Green, etc.)
26B25 Convexity, generalizations
26B30 Absolutely continuous functions, functions of bounded variation
26B35 Special properties of functions of several variables, Hölder conditions, etc.
26B40 Representation and superposition of functions
26B99 None of the above, but in this section
26Cxx **Polynomials, rational functions**
26C05 Polynomials: analytic properties, etc. [See also 12Dxx, 12Exx]
26C10 Polynomials: location of zeros [See also 12D10, 30C15, 65H05]
26C15 Rational functions [See also 14Pxx]
26C99 None of the above, but in this section
26Dxx **Inequalities {For maximal function inequalities, see 42B25; for functional inequalities, see 39B72; for probabilistic inequalities, see 60E15}**
26D05 Inequalities for trigonometric functions and polynomials
26D07 Inequalities involving other types of functions
26D10 Inequalities involving derivatives and differential and integral operators
26D15 Inequalities for sums, series and integrals
26D20 Other analytical inequalities
26D99 None of the above, but in this section
26Exx **Miscellaneous topics [See also 58Cxx]**
26E05 Real-analytic functions [See also 32B05, 32C05]
26E10 C^∞-functions, quasi-analytic functions [See also 58C25]
26E15 Calculus of functions on infinite-dimensional spaces [See also 46G05, 58Cxx]
26E20 Calculus of functions taking values in infinite-dimensional spaces [See also 46E40, 46G10, 58Cxx]
26E25 Set-valued functions [See also 28B20, 49J53, 54C60] {For nonsmooth analysis, see 49J52, 58Cxx, 90Cxx}
26E30 Non-Archimedean analysis [See also 12J25]
26E35 Nonstandard analysis [See also 03H05, 28E05, 54J05]
26E40 Constructive real analysis [See also 03F60]
26E50 Fuzzy real analysis [See also 03E72, 28E10]
26E60 Means [See also 47A64]
26E70 Real analysis on time scales or measure chains {For dynamic equations on time scales or measure chains see 34N05}
26E99 None of the above, but in this section

28-XX **MEASURE AND INTEGRATION {For analysis on manifolds, see 58-XX}**
28-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
28-01 Instructional exposition (textbooks, tutorial papers, etc.)
28-02 Research exposition (monographs, survey articles)
28-03 Historical (must also be assigned at least one classification number from Section 01)
28-04 Explicit machine computation and programs (not the theory of computation or programming)
28-06 Proceedings, conferences, collections, etc.
28Axx **Classical measure theory**
28A05 Classes of sets (Borel fields, σ-rings, etc.), measurable sets, Suslin sets, analytic sets [See also 03E15, 26A21, 54H05]
28A10 Real- or complex-valued set functions
28A12 Contents, measures, outer measures, capacities
28A15 Abstract differentiation theory, differentiation of set functions [See also 26A24]
28A20 Measurable and nonmeasurable functions, sequences of measurable functions, modes of convergence
28A25 Integration with respect to measures and other set functions
28A33 Spaces of measures, convergence of measures [See also 46E27, 60Bxx]
28A35 Measures and integrals in product spaces
28A50 Integration and disintegration of measures
28A51 Lifting theory [See also 46G15]
28A60 Measures on Boolean rings, measure algebras [See also 54H10]
28A75 Length, area, volume, other geometric measure theory [See also 26B15, 49Q15]
28A78 Hausdorff and packing measures
28A80 Fractals [See also 37Fxx]

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28A99 None of the above, but in this section
28Bxx **Set functions, measures and integrals with values in abstract spaces**
28B05 Vector-valued set functions, measures and integrals [See also 46G10]
28B10 Group- or semigroup-valued set functions, measures and integrals
28B15 Set functions, measures and integrals with values in ordered spaces
28B20 Set-valued set functions and measures; integration of set-valued functions; measurable selections [See also 26E25, 54C60, 54C65, 91B14]
28B99 None of the above, but in this section
28Cxx **Set functions and measures on spaces with additional structure [See also 46G12, 58C35, 58D20]**
28C05 Integration theory via linear functionals (Radon measures, Daniell integrals, etc.), representing set functions and measures
28C10 Set functions and measures on topological groups or semigroups, Haar measures, invariant measures [See also 22Axx, 43A05]
28C15 Set functions and measures on topological spaces (regularity of measures, etc.)
28C20 Set functions and measures and integrals in infinite-dimensional spaces (Wiener measure, Gaussian measure, etc.) [See also 46G12, 58C35, 58D20, 60B11]
28C99 None of the above, but in this section
28Dxx **Measure-theoretic ergodic theory [See also 11K50, 11K55, 22D40, 37Axx, 47A35, 54H20, 60Fxx, 60G10]**
28D05 Measure-preserving transformations
28D10 One-parameter continuous families of measure-preserving transformations
28D15 General groups of measure-preserving transformations
28D20 Entropy and other invariants
28D99 None of the above, but in this section
28Exx **Miscellaneous topics in measure theory**
28E05 Nonstandard measure theory [See also 03H05, 26E35]
28E10 Fuzzy measure theory [See also 03E72, 26E50, 94D05]
28E15 Other connections with logic and set theory
28E99 None of the above, but in this section

30-XX **FUNCTIONS OF A COMPLEX VARIABLE {For analysis on manifolds, see 58-XX}**
30-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
30-01 Instructional exposition (textbooks, tutorial papers, etc.)
30-02 Research exposition (monographs, survey articles)
30-03 Historical (must also be assigned at least one classification number from Section 01)
30-04 Explicit machine computation and programs (not the theory of computation or programming)
30-06 Proceedings, conferences, collections, etc.
30Axx **General properties**
30A05 Monogenic properties of complex functions (including polygenic and areolar monogenic functions)
30A10 Inequalities in the complex domain
30A99 None of the above, but in this section
30Bxx **Series expansions**
30B10 Power series (including lacunary series)
30B20 Random power series
30B30 Boundary behavior of power series, over-convergence
30B40 Analytic continuation
30B50 Dirichlet series and other series expansions, exponential series [See also 11M41, 42–XX]
30B60 Completeness problems, closure of a system of functions
30B70 Continued fractions [See also 11A55, 40A15]
30B99 None of the above, but in this section
30Cxx **Geometric function theory**
30C10 Polynomials
30C15 Zeros of polynomials, rational functions, and other analytic functions (e.g. zeros of functions with bounded Dirichlet integral) {For algebraic theory, see 12D10; for real methods, see 26C10}
30C20 Conformal mappings of special domains
30C25 Covering theorems in conformal mapping theory
30C30 Numerical methods in conformal mapping theory [See also 65E05]
30C35 General theory of conformal mappings
30C40 Kernel functions and applications
30C45 Special classes of univalent and multivalent functions (starlike, convex, bounded rotation, etc.)
30C50 Coefficient problems for univalent and multivalent functions
30C55 General theory of univalent and multivalent functions
30C62 Quasiconformal mappings in the plane
30C65 Quasiconformal mappings in $\mathbf{R}^n$, other generalizations
30C70 Extremal problems for conformal and quasiconformal mappings, variational methods
30C75 Extremal problems for conformal and quasiconformal mappings, other methods
30C80 Maximum principle; Schwarz's lemma, Lindelöf principle, analogues and generalizations; subordination
30C85 Capacity and harmonic measure in the complex plane [See also 31A15]
30C99 None of the above, but in this section
30Dxx **Entire and meromorphic functions, and related topics**
30D05 Functional equations in the complex domain, iteration and composition of analytic functions [See also 34Mxx, 37Fxx, 39–XX]
30D10 Representations of entire functions by series and integrals
30D15 Special classes of entire functions and growth estimates
30D20 Entire functions, general theory
30D30 Meromorphic functions, general theory
30D35 Distribution of values, Nevanlinna theory
30D40 Cluster sets, prime ends, boundary behavior
30D45 Bloch functions, normal functions, normal families
30D60 Quasi-analytic and other classes of functions
30D99 None of the above, but in this section
30Exx **Miscellaneous topics of analysis in the complex domain**
30E05 Moment problems, interpolation problems
30E10 Approximation in the complex domain
30E15 Asymptotic representations in the complex domain
30E20 Integration, integrals of Cauchy type, integral representations of analytic functions [See also 45Exx]
30E25 Boundary value problems [See also 45Exx]
30E99 None of the above, but in this section
30Fxx **Riemann surfaces**
30F10 Compact Riemann surfaces and uniformization [See also 14H15, 32G15]
30F15 Harmonic functions on Riemann surfaces
30F20 Classification theory of Riemann surfaces
30F25 Ideal boundary theory
30F30 Differentials on Riemann surfaces
30F35 Fuchsian groups and automorphic functions [See also 11Fxx, 20H10, 22E40, 32Gxx, 32Nxx]
30F40 Kleinian groups [See also 20H10]
30F45 Conformal metrics (hyperbolic, Poincaré, distance functions)
30F50 Klein surfaces
30F60 Teichmüller theory [See also 32G15]
30F99 None of the above, but in this section
30Gxx **Generalized function theory**
30G06 Non-Archimedean function theory [See also 12J25]; nonstandard function theory [See also 03H05]
30G12 Finely holomorphic functions and topological function theory
30G20 Generalizations of Bers or Vekua type (pseudoanalytic, p-analytic, etc.)
30G25 Discrete analytic functions
30G30 Other generalizations of analytic functions (including abstract-valued functions)
30G35 Functions of hypercomplex variables and generalized variables
30G99 None of the above, but in this section
30Hxx **Spaces and algebras of analytic functions**
30H05 Bounded analytic functions
30H10 Hardy spaces
30H15 Nevanlinna class and Smirnov class
30H20 Bergman spaces, Fock spaces
30H25 Besov spaces and Q_p-spaces
30H30 Bloch spaces
30H35 BMO-spaces
30H50 Algebras of analytic functions
30H80 Corona theorems
30H99 None of the above, but in this section
30Jxx **Function theory on the disc**
30J05 Inner functions
30J10 Blaschke products
30J15 Singular inner functions
30J99 None of the above, but in this section
30Kxx **Universal holomorphic functions**
30K05 Universal Taylor series
30K10 Universal Dirichlet series
30K15 Bounded universal functions
30K20 Compositional universality
30K99 None of the above, but in this section
30Lxx **Analysis on metric spaces**
30L05 Geometric embeddings of metric spaces
30L10 Quasiconformal mappings in metric spaces
30L99 None of the above, but in this section

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31-XX **POTENTIAL THEORY {For probabilistic potential theory, see 60J45}**
- 31-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
- 31-01 Instructional exposition (textbooks, tutorial papers, etc.)
- 31-02 Research exposition (monographs, survey articles)
- 31-03 Historical (must also be assigned at least one classification number from Section 01)
- 31-04 Explicit machine computation and programs (not the theory of computation or programming)
- 31-06 Proceedings, conferences, collections, etc.

31Axx **Two-dimensional theory**
- 31A05 Harmonic, subharmonic, superharmonic functions
- 31A10 Integral representations, integral operators, integral equations methods
- 31A15 Potentials and capacity, harmonic measure, extremal length [See also 30C85]
- 31A20 Boundary behavior (theorems of Fatou type, etc.)
- 31A25 Boundary value and inverse problems
- 31A30 Biharmonic, polyharmonic functions and equations, Poisson's equation
- 31A35 Connections with differential equations
- 31A99 None of the above, but in this section

31Bxx **Higher-dimensional theory**
- 31B05 Harmonic, subharmonic, superharmonic functions
- 31B10 Integral representations, integral operators, integral equations methods
- 31B15 Potentials and capacities, extremal length
- 31B20 Boundary value and inverse problems
- 31B25 Boundary behavior
- 31B30 Biharmonic and polyharmonic equations and functions
- 31B35 Connections with differential equations
- 31B99 None of the above, but in this section

31Cxx **Other generalizations**
- 31C05 Harmonic, subharmonic, superharmonic functions
- 31C10 Pluriharmonic and plurisubharmonic functions [See also 32U05]
- 31C12 Potential theory on Riemannian manifolds [See also 53C20; for Hodge theory, see 58A14]
- 31C15 Potentials and capacities
- 31C20 Discrete potential theory and numerical methods
- 31C25 Dirichlet spaces
- 31C35 Martin boundary theory [See also 60J50]
- 31C40 Fine potential theory
- 31C45 Other generalizations (nonlinear potential theory, etc.)
- 31C99 None of the above, but in this section

31Dxx **Axiomatic potential theory**
- 31D05 Axiomatic potential theory
- 31D99 None of the above, but in this section

31Exx **Potential theory on metric spaces**
- 31E05 Potential theory on metric spaces
- 31E99 None of the above, but in this section

32-XX **SEVERAL COMPLEX VARIABLES AND ANALYTIC SPACES {For infinite-dimensional holomorphy, see 46G20, 58B12}**
- 32-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
- 32-01 Instructional exposition (textbooks, tutorial papers, etc.)
- 32-02 Research exposition (monographs, survey articles)
- 32-03 Historical (must also be assigned at least one classification number from Section 01)
- 32-04 Explicit machine computation and programs (not the theory of computation or programming)
- 32-06 Proceedings, conferences, collections, etc.

32Axx **Holomorphic functions of several complex variables**
- 32A05 Power series, series of functions
- 32A07 Special domains (Reinhardt, Hartogs, circular, tube)
- 32A10 Holomorphic functions
- 32A12 Multifunctions
- 32A15 Entire functions
- 32A17 Special families of functions
- 32A18 Bloch functions, normal functions
- 32A19 Normal families of functions, mappings
- 32A20 Meromorphic functions
- 32A22 Nevanlinna theory (local); growth estimates; other inequalities {For geometric theory, see 32H25, 32H30}
- 32A25 Integral representations; canonical kernels (Szegő, Bergman, etc.)
- 32A26 Integral representations, constructed kernels (e.g. Cauchy, Fantappiè-type kernels)
- 32A27 Local theory of residues [See also 32C30]
- 32A30 Other generalizations of function theory of one complex variable (should also be assigned at least one classification number from Section 30) {For functions of several hypercomplex variables, see 30G35}
- 32A35 H^p-spaces, Nevanlinna spaces [See also 32M15, 42B30, 43A85, 46J15]
- 32A36 Bergman spaces
- 32A37 Other spaces of holomorphic functions (e.g. bounded mean oscillation (BMOA), vanishing mean oscillation (VMOA)) [See also 46Exx]
- 32A38 Algebras of holomorphic functions [See also 30H05, 46J10, 46J15]
- 32A40 Boundary behavior of holomorphic functions
- 32A45 Hyperfunctions [See also 46F15]
- 32A50 Harmonic analysis of several complex variables [See mainly 43–XX]
- 32A55 Singular integrals
- 32A60 Zero sets of holomorphic functions
- 32A65 Banach algebra techniques [See mainly 46Jxx]
- 32A70 Functional analysis techniques [See mainly 46Exx]
- 32A99 None of the above, but in this section

32Bxx **Local analytic geometry [See also 13–XX and 14–XX]**
- 32B05 Analytic algebras and generalizations, preparation theorems
- 32B10 Germs of analytic sets, local parametrization
- 32B15 Analytic subsets of affine space
- 32B20 Semi-analytic sets and subanalytic sets [See also 14P15]
- 32B25 Triangulation and related questions
- 32B99 None of the above, but in this section

32Cxx **Analytic spaces**
- 32C05 Real-analytic manifolds, real-analytic spaces [See also 14Pxx, 58A07]
- 32C07 Real-analytic sets, complex Nash functions [See also 14P15, 14P20]
- 32C09 Embedding of real analytic manifolds
- 32C11 Complex supergeometry [See also 14A22, 14M30, 58A50]
- 32C15 Complex spaces
- 32C18 Topology of analytic spaces
- 32C20 Normal analytic spaces
- 32C22 Embedding of analytic spaces
- 32C25 Analytic subsets and submanifolds
- 32C30 Integration on analytic sets and spaces, currents {For local theory, see 32A25 or 32A27}
- 32C35 Analytic sheaves and cohomology groups [See also 14Fxx, 18F20, 55N30]
- 32C36 Local cohomology of analytic spaces
- 32C37 Duality theorems
- 32C38 Sheaves of differential operators and their modules, D-modules [See also 14F10, 16S32, 35A27, 58J15]
- 32C55 The Levi problem in complex spaces; generalizations
- 32C81 Applications to physics
- 32C99 None of the above, but in this section

32Dxx **Analytic continuation**
- 32D05 Domains of holomorphy
- 32D10 Envelopes of holomorphy
- 32D15 Continuation of analytic objects
- 32D20 Removable singularities
- 32D26 Riemann domains
- 32D99 None of the above, but in this section

32Exx **Holomorphic convexity**
- 32E05 Holomorphically convex complex spaces, reduction theory
- 32E10 Stein spaces, Stein manifolds
- 32E20 Polynomial convexity
- 32E30 Holomorphic and polynomial approximation, Runge pairs, interpolation
- 32E35 Global boundary behavior of holomorphic functions
- 32E40 The Levi problem
- 32E99 None of the above, but in this section

32Fxx **Geometric convexity**
- 32F10 q-convexity, q-concavity
- 32F17 Other notions of convexity
- 32F18 Finite-type conditions
- 32F27 Topological consequences of geometric convexity
- 32F32 Analytical consequences of geometric convexity (vanishing theorems, etc.)
- 32F45 Invariant metrics and pseudodistances
- 32F99 None of the above, but in this section

32Gxx **Deformations of analytic structures**
- 32G05 Deformations of complex structures [See also 13D10, 16S80, 58H10, 58H15]
- 32G07 Deformations of special (e.g. CR) structures
- 32G08 Deformations of fiber bundles
- 32G10 Deformations of submanifolds and subspaces
- 32G13 Analytic moduli problems {For algebraic moduli problems, see 14D20, 14D22, 14H10, 14J10} [See also 14H15, 14J15]
- 32G15 Moduli of Riemann surfaces, Teichmüller theory [See also 14H15, 30Fxx]

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32G20 Period matrices, variation of Hodge structure; degenerations [See also 14D05, 14D07, 14K30]
32G34 Moduli and deformations for ordinary differential equations (e.g. Knizhnik-Zamolodchikov equation) [See also 34Mxx]
32G81 Applications to physics
32G99 None of the above, but in this section
32Hxx **Holomorphic mappings and correspondences**
32H02 Holomorphic mappings, (holomorphic) embeddings and related questions
32H04 Meromorphic mappings
32H12 Boundary uniqueness of mappings
32H25 Picard-type theorems and generalizations {For function-theoretic properties, see 32A22}
32H30 Value distribution theory in higher dimensions {For function-theoretic properties, see 32A22}
32H35 Proper mappings, finiteness theorems
32H40 Boundary regularity of mappings
32H50 Iteration problems
32H99 None of the above, but in this section
32Jxx **Compact analytic spaces {For Riemann surfaces, see 14Hxx, 30Fxx; for algebraic theory, see 14Jxx}**
32J05 Compactification of analytic spaces
32J10 Algebraic dependence theorems
32J15 Compact surfaces
32J17 Compact 3-folds
32J18 Compact n-folds
32J25 Transcendental methods of algebraic geometry [See also 14C30]
32J27 Compact Kähler manifolds: generalizations, classification
32J81 Applications to physics
32J99 None of the above, but in this section
32Kxx **Generalizations of analytic spaces (should also be assigned at least one other classification number from Section 32 describing the type of problem)**
32K05 Banach analytic spaces [See also 58Bxx]
32K07 Formal and graded complex spaces [See also 58C50]
32K15 Differentiable functions on analytic spaces, differentiable spaces [See also 58C25]
32K99 None of the above, but in this section
32Lxx **Holomorphic fiber spaces [See also 55Rxx]**
32L05 Holomorphic bundles and generalizations
32L10 Sheaves and cohomology of sections of holomorphic vector bundles, general results [See also 14F05, 18F20, 55N30]
32L15 Bundle convexity [See also 32F10]
32L20 Vanishing theorems
32L25 Twistor theory, double fibrations [See also 53C28]
32L81 Applications to physics
32L99 None of the above, but in this section
32Mxx **Complex spaces with a group of automorphisms**
32M05 Complex Lie groups, automorphism groups acting on complex spaces [See also 22E10]
32M10 Homogeneous complex manifolds [See also 14M17, 57T15]
32M12 Almost homogeneous manifolds and spaces [See also 14M17]
32M15 Hermitian symmetric spaces, bounded symmetric domains, Jordan algebras [See also 22E10, 22E40, 53C35, 57T15]
32M17 Automorphism groups of $\mathbf{C}^n$ and affine manifolds
32M25 Complex vector fields
32M99 None of the above, but in this section
32Nxx **Automorphic functions [See also 11Fxx, 20H10, 22E40, 30F35]**
32N05 General theory of automorphic functions of several complex variables
32N10 Automorphic forms
32N15 Automorphic functions in symmetric domains
32N99 None of the above, but in this section
32Pxx **Non-Archimedean analysis (should also be assigned at least one other classification number from Section 32 describing the type of problem)**
32P05 Non-Archimedean analysis (should also be assigned at least one other classification number from Section 32 describing the type of problem)
32P99 None of the above, but in this section
32Qxx **Complex manifolds**
32Q05 Negative curvature manifolds
32Q10 Positive curvature manifolds
32Q15 Kähler manifolds
32Q20 Kähler-Einstein manifolds [See also 53Cxx]
32Q25 Calabi-Yau theory [See also 14J30]
32Q26 Notions of stability
32Q28 Stein manifolds
32Q30 Uniformization
32Q35 Complex manifolds as subdomains of Euclidean space
32Q40 Embedding theorems
32Q45 Hyperbolic and Kobayashi hyperbolic manifolds
32Q55 Topological aspects of complex manifolds
32Q57 Classification theorems
32Q60 Almost complex manifolds
32Q65 Pseudoholomorphic curves
32Q99 None of the above, but in this section
32Sxx **Singularities [See also 58Kxx]**
32S05 Local singularities [See also 14J17]
32S10 Invariants of analytic local rings
32S15 Equisingularity (topological and analytic) [See also 14E15]
32S20 Global theory of singularities; cohomological properties [See also 14E15]
32S22 Relations with arrangements of hyperplanes [See also 52C35]
32S25 Surface and hypersurface singularities [See also 14J17]
32S30 Deformations of singularities; vanishing cycles [See also 14B07]
32S35 Mixed Hodge theory of singular varieties [See also 14C30, 14D07]
32S40 Monodromy; relations with differential equations and D-modules
32S45 Modifications; resolution of singularities [See also 14E15]
32S50 Topological aspects: Lefschetz theorems, topological classification, invariants
32S55 Milnor fibration; relations with knot theory [See also 57M25, 57Q45]
32S60 Stratifications; constructible sheaves; intersection cohomology [See also 58Kxx]
32S65 Singularities of holomorphic vector fields and foliations
32S70 Other operations on singularities
32S99 None of the above, but in this section
32Txx **Pseudoconvex domains**
32T05 Domains of holomorphy
32T15 Strongly pseudoconvex domains
32T20 Worm domains
32T25 Finite type domains
32T27 Geometric and analytic invariants on weakly pseudoconvex boundaries
32T35 Exhaustion functions
32T40 Peak functions
32T99 None of the above, but in this section
32Uxx **Pluripotential theory**
32U05 Plurisubharmonic functions and generalizations [See also 31C10]
32U10 Plurisubharmonic exhaustion functions
32U15 General pluripotential theory
32U20 Capacity theory and generalizations
32U25 Lelong numbers
32U30 Removable sets
32U35 Pluricomplex Green functions
32U40 Currents
32U99 None of the above, but in this section
32Vxx **CR manifolds**
32V05 CR structures, CR operators, and generalizations
32V10 CR functions
32V15 CR manifolds as boundaries of domains
32V20 Analysis on CR manifolds
32V25 Extension of functions and other analytic objects from CR manifolds
32V30 Embeddings of CR manifolds
32V35 Finite type conditions on CR manifolds
32V40 Real submanifolds in complex manifolds
32V99 None of the above, but in this section
32Wxx **Differential operators in several variables**
32W05 $\overline{\partial}$ and $\overline{\partial}$-Neumann operators
32W10 $\overline{\partial}_b$ and $\overline{\partial}_b$-Neumann operators
32W20 Complex Monge-Ampère operators
32W25 Pseudodifferential operators in several complex variables
32W30 Heat kernels in several complex variables
32W50 Other partial differential equations of complex analysis
32W99 None of the above, but in this section

33-XX **SPECIAL FUNCTIONS (33-XX DEALS WITH THE PROPERTIES OF FUNCTIONS AS FUNCTIONS) {For orthogonal functions, see 42Cxx; for aspects of combinatorics see 05Axx; for number-theoretic aspects see 11-XX; for representation theory see 22Exx}**
33-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
33-01 Instructional exposition (textbooks, tutorial papers, etc.)
33-02 Research exposition (monographs, survey articles)
33-03 Historical (must also be assigned at least one classification number from Section 01)
33-04 Explicit machine computation and programs (not the theory of computation or programming)
33-06 Proceedings, conferences, collections, etc.

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33Bxx **Elementary classical functions**
33B10 Exponential and trigonometric functions
33B15 Gamma, beta and polygamma functions
33B20 Incomplete beta and gamma functions (error functions, probability integral, Fresnel integrals)
33B30 Higher logarithm functions
33B99 None of the above, but in this section
33Cxx **Hypergeometric functions**
33C05 Classical hypergeometric functions, ${}_2F_1$
33C10 Bessel and Airy functions, cylinder functions, ${}_0F_1$
33C15 Confluent hypergeometric functions, Whittaker functions, ${}_1F_1$
33C20 Generalized hypergeometric series, ${}_pF_q$
33C45 Orthogonal polynomials and functions of hypergeometric type (Jacobi, Laguerre, Hermite, Askey scheme, etc.) [See also 42C05 for general orthogonal polynomials and functions]
33C47 Other special orthogonal polynomials and functions
33C50 Orthogonal polynomials and functions in several variables expressible in terms of special functions in one variable
33C52 Orthogonal polynomials and functions associated with root systems
33C55 Spherical harmonics
33C60 Hypergeometric integrals and functions defined by them (E, G, H and I functions)
33C65 Appell, Horn and Lauricella functions
33C67 Hypergeometric functions associated with root systems
33C70 Other hypergeometric functions and integrals in several variables
33C75 Elliptic integrals as hypergeometric functions
33C80 Connections with groups and algebras, and related topics
33C90 Applications
33C99 None of the above, but in this section
33Dxx **Basic hypergeometric functions**
33D05 q-gamma functions, q-beta functions and integrals
33D15 Basic hypergeometric functions in one variable, ${}_r\varphi_s$
33D45 Basic orthogonal polynomials and functions (Askey-Wilson polynomials, etc.)
33D50 Orthogonal polynomials and functions in several variables expressible in terms of basic hypergeometric functions in one variable
33D52 Basic orthogonal polynomials and functions associated with root systems (Macdonald polynomials, etc.)
33D60 Basic hypergeometric integrals and functions defined by them
33D65 Bibasic functions and multiple bases
33D67 Basic hypergeometric functions associated with root systems
33D70 Other basic hypergeometric functions and integrals in several variables
33D80 Connections with quantum groups, Chevalley groups, p-adic groups, Hecke algebras, and related topics
33D90 Applications
33D99 None of the above, but in this section
33Exx **Other special functions**
33E05 Elliptic functions and integrals
33E10 Lamé, Mathieu, and spheroidal wave functions
33E12 Mittag-Leffler functions and generalizations
33E15 Other wave functions
33E17 Painlevé-type functions
33E20 Other functions defined by series and integrals
33E30 Other functions coming from differential, difference and integral equations
33E50 Special functions in characteristic p (gamma functions, etc.)
33E99 None of the above, but in this section
33Fxx **Computational aspects**
33F05 Numerical approximation and evaluation [See also 65D20]
33F10 Symbolic computation (Gosper and Zeilberger algorithms, etc.) [See also 68W30]
33F99 None of the above, but in this section

34-XX **ORDINARY DIFFERENTIAL EQUATIONS**
34-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
34-01 Instructional exposition (textbooks, tutorial papers, etc.)
34-02 Research exposition (monographs, survey articles)
34-03 Historical (must also be assigned at least one classification number from Section 01)
34-04 Explicit machine computation and programs (not the theory of computation or programming)
34-06 Proceedings, conferences, collections, etc.
34Axx **General theory**
34A05 Explicit solutions and reductions
34A07 Fuzzy differential equations
34A08 Fractional differential equations
34A09 Implicit equations, differential-algebraic equations [See also 65L80]
34A12 Initial value problems, existence, uniqueness, continuous dependence and continuation of solutions
34A25 Analytical theory: series, transformations, transforms, operational calculus, etc. [See also 44–XX]
34A26 Geometric methods in differential equations
34A30 Linear equations and systems, general
34A33 Lattice differential equations
34A34 Nonlinear equations and systems, general
34A35 Differential equations of infinite order
34A36 Discontinuous equations
34A37 Differential equations with impulses
34A38 Hybrid systems
34A40 Differential inequalities [See also 26D20]
34A45 Theoretical approximation of solutions {For numerical analysis, see 65Lxx}
34A55 Inverse problems
34A60 Differential inclusions [See also 49J21, 49K21]
34A99 None of the above, but in this section
34Bxx **Boundary value problems {For ordinary differential operators, see 34Lxx}**
34B05 Linear boundary value problems
34B07 Linear boundary value problems with nonlinear dependence on the spectral parameter
34B08 Parameter dependent boundary value problems
34B09 Boundary eigenvalue problems
34B10 Nonlocal and multipoint boundary value problems
34B15 Nonlinear boundary value problems
34B16 Singular nonlinear boundary value problems
34B18 Positive solutions of nonlinear boundary value problems
34B20 Weyl theory and its generalizations
34B24 Sturm-Liouville theory [See also 34Lxx]
34B27 Green functions
34B30 Special equations (Mathieu, Hill, Bessel, etc.)
34B37 Boundary value problems with impulses
34B40 Boundary value problems on infinite intervals
34B45 Boundary value problems on graphs and networks
34B60 Applications
34B99 None of the above, but in this section
34Cxx **Qualitative theory [See also 37–XX]**
34C05 Location of integral curves, singular points, limit cycles
34C07 Theory of limit cycles of polynomial and analytic vector fields (existence, uniqueness, bounds, Hilbert's 16th problem and ramifications)
34C08 Connections with real algebraic geometry (fewnomials, desingularization, zeros of Abelian integrals, etc.)
34C10 Oscillation theory, zeros, disconjugacy and comparison theory
34C11 Growth, boundedness
34C12 Monotone systems
34C14 Symmetries, invariants
34C15 Nonlinear oscillations, coupled oscillators
34C20 Transformation and reduction of equations and systems, normal forms
34C23 Bifurcation [See also 37Gxx]
34C25 Periodic solutions
34C26 Relaxation oscillations
34C27 Almost and pseudo-almost periodic solutions
34C28 Complex behavior, chaotic systems [See also 37Dxx]
34C29 Averaging method
34C37 Homoclinic and heteroclinic solutions
34C40 Equations and systems on manifolds
34C41 Equivalence, asymptotic equivalence
34C45 Invariant manifolds
34C46 Multifrequency systems
34C55 Hysteresis
34C60 Qualitative investigation and simulation of models
34C99 None of the above, but in this section
34Dxx **Stability theory [See also 37C75, 93Dxx]**
34D05 Asymptotic properties
34D06 Synchronization
34D08 Characteristic and Lyapunov exponents
34D09 Dichotomy, trichotomy
34D10 Perturbations
34D15 Singular perturbations
34D20 Stability
34D23 Global stability
34D30 Structural stability and analogous concepts [See also 37C20]
34D35 Stability of manifolds of solutions
34D45 Attractors [See also 37C70, 37D45]
34D99 None of the above, but in this section

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34Exx **Asymptotic theory**
34E05 Asymptotic expansions
34E10 Perturbations, asymptotics
34E13 Multiple scale methods
34E15 Singular perturbations, general theory
34E17 Canard solutions
34E18 Methods of nonstandard analysis
34E20 Singular perturbations, turning point theory, WKB methods
34E99 None of the above, but in this section
34Fxx **Equations and systems with randomness [See also 34K50, 60H10, 93E03]**
34F05 Equations and systems with randomness [See also 34K50, 60H10, 93E03]
34F10 Bifurcation
34F15 Resonance phenomena
34F99 None of the above, but in this section
34Gxx **Differential equations in abstract spaces [See also 34Lxx, 37Kxx, 47Dxx, 47Hxx, 47Jxx, 58D25]**
34G10 Linear equations [See also 47D06, 47D09]
34G20 Nonlinear equations [See also 47Hxx, 47Jxx]
34G25 Evolution inclusions
34G99 None of the above, but in this section
34Hxx **Control problems [See also 49J15, 49K15, 93C15]**
34H05 Control problems [See also 49J15, 49K15, 93C15]
34H10 Chaos control
34H15 Stabilization
34H20 Bifurcation control
34H99 None of the above, but in this section
34Kxx **Functional-differential and differential-difference equations [See also 37–XX]**
34K05 General theory
34K06 Linear functional-differential equations
34K07 Theoretical approximation of solutions
34K08 Spectral theory of functional-differential operators
34K09 Functional-differential inclusions
34K10 Boundary value problems
34K11 Oscillation theory
34K12 Growth, boundedness, comparison of solutions
34K13 Periodic solutions
34K14 Almost and pseudo-periodic solutions
34K17 Transformation and reduction of equations and systems, normal forms
34K18 Bifurcation theory
34K19 Invariant manifolds
34K20 Stability theory
34K21 Stationary solutions
34K23 Complex (chaotic) behavior of solutions
34K25 Asymptotic theory
34K26 Singular perturbations
34K27 Perturbations
34K28 Numerical approximation of solutions
34K29 Inverse problems
34K30 Equations in abstract spaces [See also 34Gxx, 35R09, 35R10, 47Jxx]
34K31 Lattice functional-differential equations
34K32 Implicit equations
34K33 Averaging
34K34 Hybrid systems
34K35 Control problems [See also 49J21, 49K21, 93C23]
34K36 Fuzzy functional-differential equations
34K37 Functional-differential equations with fractional derivatives
34K38 Functional-differential inequalities
34K40 Neutral equations
34K45 Equations with impulses
34K50 Stochastic functional-differential equations [See also 60Hxx]
34K60 Qualitative investigation and simulation of models
34K99 None of the above, but in this section
34Lxx **Ordinary differential operators [See also 47E05]**
34L05 General spectral theory
34L10 Eigenfunctions, eigenfunction expansions, completeness of eigenfunctions
34L15 Eigenvalues, estimation of eigenvalues, upper and lower bounds
34L16 Numerical approximation of eigenvalues and of other parts of the spectrum
34L20 Asymptotic distribution of eigenvalues, asymptotic theory of eigenfunctions
34L25 Scattering theory, inverse scattering
34L30 Nonlinear ordinary differential operators
34L40 Particular operators (Dirac, one-dimensional Schrödinger, etc.)
34L99 None of the above, but in this section
34Mxx **Differential equations in the complex domain [See also 30Dxx, 32G34]**
34M03 Linear equations and systems
34M05 Entire and meromorphic solutions
34M10 Oscillation, growth of solutions
34M15 Algebraic aspects (differential-algebraic, hypertranscendence, group-theoretical)
34M25 Formal solutions, transform techniques
34M30 Asymptotics, summation methods
34M35 Singularities, monodromy, local behavior of solutions, normal forms
34M40 Stokes phenomena and connection problems (linear and nonlinear)
34M45 Differential equations on complex manifolds
34M50 Inverse problems (Riemann-Hilbert, inverse differential Galois, etc.)
34M55 Painlevé and other special equations; classification, hierarchies;
34M56 Isomonodromic deformations
34M60 Singular perturbation problems in the complex domain (complex WKB, turning points, steepest descent) [See also 34E20]
34M99 None of the above, but in this section
34Nxx **Dynamic equations on time scales or measure chains {For real analysis on time scales see 26E70}**
34N05 Dynamic equations on time scales or measure chains {For real analysis on time scales or measure chains, see 26E70}
34N99 None of the above, but in this section

35-XX **PARTIAL DIFFERENTIAL EQUATIONS**
35-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
35-01 Instructional exposition (textbooks, tutorial papers, etc.)
35-02 Research exposition (monographs, survey articles)
35-03 Historical (must also be assigned at least one classification number from Section 01)
35-04 Explicit machine computation and programs (not the theory of computation or programming)
35-06 Proceedings, conferences, collections, etc.
35Axx **General topics**
35A01 Existence problems: global existence, local existence, non-existence
35A02 Uniqueness problems: global uniqueness, local uniqueness, non-uniqueness
35A08 Fundamental solutions
35A09 Classical solutions
35A10 Cauchy-Kovalevskaya theorems
35A15 Variational methods
35A16 Topological and monotonicity methods
35A17 Parametrices
35A18 Wave front sets
35A20 Analytic methods, singularities
35A21 Propagation of singularities
35A22 Transform methods (e.g. integral transforms)
35A23 Inequalities involving derivatives and differential and integral operators, inequalities for integrals
35A24 Methods of ordinary differential equations
35A25 Other special methods
35A27 Microlocal methods; methods of sheaf theory and homological algebra in PDE [See also 32C38, 58J15]
35A30 Geometric theory, characteristics, transformations [See also 58J70, 58J72]
35A35 Theoretical approximation to solutions {For numerical analysis, see 65Mxx, 65Nxx}
35A99 None of the above, but in this section
35Bxx **Qualitative properties of solutions**
35B05 Oscillation, zeros of solutions, mean value theorems, etc.
35B06 Symmetries, invariants, etc.
35B07 Axially symmetric solutions
35B08 Entire solutions
35B09 Positive solutions
35B10 Periodic solutions
35B15 Almost and pseudo-almost periodic solutions
35B20 Perturbations
35B25 Singular perturbations
35B27 Homogenization; equations in media with periodic structure [See also 74Qxx, 76M50]
35B30 Dependence of solutions on initial and boundary data, parameters [See also 37Cxx]
35B32 Bifurcation [See also 37Gxx, 37K50]
35B33 Critical exponents
35B34 Resonances
35B35 Stability
35B36 Pattern formation
35B38 Critical points
35B40 Asymptotic behavior of solutions
35B41 Attractors

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35B42 Inertial manifolds
35B44 Blow-up
35B45 A priori estimates
35B50 Maximum principles
35B51 Comparison principles
35B53 Liouville theorems, Phragmén-Lindelöf theorems
35B60 Continuation and prolongation of solutions [See also 58A15, 58A17, 58Hxx]
35B65 Smoothness and regularity of solutions
35B99 None of the above, but in this section

35Cxx **Representations of solutions**
35C05 Solutions in closed form
35C06 Self-similar solutions
35C07 Traveling wave solutions
35C08 Soliton solutions
35C09 Trigonometric solutions
35C10 Series solutions
35C11 Polynomial solutions
35C15 Integral representations of solutions
35C20 Asymptotic expansions
35C99 None of the above, but in this section

35Dxx **Generalized solutions**
35D30 Weak solutions
35D35 Strong solutions
35D40 Viscosity solutions
35D99 None of the above, but in this section

35Exx **Equations and systems with constant coefficients [See also 35N05]**
35E05 Fundamental solutions
35E10 Convexity properties
35E15 Initial value problems
35E20 General theory
35E99 None of the above, but in this section

35Fxx **General first-order equations and systems**
35F05 Linear first-order equations
35F10 Initial value problems for linear first-order equations
35F15 Boundary value problems for linear first-order equations
35F16 Initial-boundary value problems for linear first-order equations
35F20 Nonlinear first-order equations
35F21 Hamilton-Jacobi equations
35F25 Initial value problems for nonlinear first-order equations
35F30 Boundary value problems for nonlinear first-order equations
35F31 Initial-boundary value problems for nonlinear first-order equations
35F35 Linear first-order systems
35F40 Initial value problems for linear first-order systems
35F45 Boundary value problems for linear first-order systems
35F46 Initial-boundary value problems for linear first-order systems
35F50 Nonlinear first-order systems
35F55 Initial value problems for nonlinear first-order systems
35F60 Boundary value problems for nonlinear first-order systems
35F61 Initial-boundary value problems for nonlinear first-order systems
35F99 None of the above, but in this section

35Gxx **General higher-order equations and systems**
35G05 Linear higher-order equations
35G10 Initial value problems for linear higher-order equations
35G15 Boundary value problems for linear higher-order equations
35G16 Initial-boundary value problems for linear higher-order equations
35G20 Nonlinear higher-order equations
35G25 Initial value problems for nonlinear higher-order equations
35G30 Boundary value problems for nonlinear higher-order equations
35G31 Initial-boundary value problems for nonlinear higher-order equations
35G35 Linear higher-order systems
35G40 Initial value problems for linear higher-order systems
35G45 Boundary value problems for linear higher-order systems
35G46 Initial-boundary value problems for linear higher-order systems
35G50 Nonlinear higher-order systems
35G55 Initial value problems for nonlinear higher-order systems
35G60 Boundary value problems for nonlinear higher-order systems
35G61 Initial-boundary value problems for nonlinear higher-order systems
35G99 None of the above, but in this section

35Hxx **Close-to-elliptic equations and systems**
35H10 Hypoelliptic equations
35H20 Subelliptic equations
35H30 Quasi-elliptic equations
35H99 None of the above, but in this section

35Jxx **Elliptic equations and systems [See also 58J10, 58J20]**
35J05 Laplacian operator, reduced wave equation (Helmholtz equation), Poisson equation [See also 31Axx, 31Bxx]
35J08 Green's functions
35J10 Schrödinger operator [See also 35Pxx]
35J15 Second-order elliptic equations
35J20 Variational methods for second-order elliptic equations
35J25 Boundary value problems for second-order elliptic equations
35J30 Higher-order elliptic equations [See also 31A30, 31B30]
35J35 Variational methods for higher-order elliptic equations
35J40 Boundary value problems for higher-order elliptic equations
35J46 First-order elliptic systems
35J47 Second-order elliptic systems
35J48 Higher-order elliptic systems
35J50 Variational methods for elliptic systems
35J56 Boundary value problems for first-order elliptic systems
35J57 Boundary value problems for second-order elliptic systems
35J58 Boundary value problems for higher-order elliptic systems
35J60 Nonlinear elliptic equations
35J61 Semilinear elliptic equations
35J62 Quasilinear elliptic equations
35J65 Nonlinear boundary value problems for linear elliptic equations
35J66 Nonlinear boundary value problems for nonlinear elliptic equations
35J67 Boundary values of solutions to elliptic equations
35J70 Degenerate elliptic equations
35J75 Singular elliptic equations
35J86 Linear elliptic unilateral problems and linear elliptic variational inequalities [See also 35R35, 49J40]
35J87 Nonlinear elliptic unilateral problems and nonlinear elliptic variational inequalities [See also 35R35, 49J40]
35J88 Systems of elliptic variational inequalities [See also 35R35, 49J40]
35J91 Semilinear elliptic equations with Laplacian, bi-Laplacian or poly-Laplacian
35J92 Quasilinear elliptic equations with p-Laplacian
35J93 Quasilinear elliptic equations with mean curvature operator
35J96 Elliptic Monge-Ampère equations
35J99 None of the above, but in this section

35Kxx **Parabolic equations and systems [See also 35Bxx, 35Dxx, 35R30, 35R35, 58J35]**
35K05 Heat equation
35K08 Heat kernel
35K10 Second-order parabolic equations
35K15 Initial value problems for second-order parabolic equations
35K20 Initial-boundary value problems for second-order parabolic equations
35K25 Higher-order parabolic equations
35K30 Initial value problems for higher-order parabolic equations
35K35 Initial-boundary value problems for higher-order parabolic equations
35K40 Second-order parabolic systems
35K41 Higher-order parabolic systems
35K45 Initial value problems for second-order parabolic systems
35K46 Initial value problems for higher-order parabolic systems
35K51 Initial-boundary value problems for second-order parabolic systems
35K52 Initial-boundary value problems for higher-order parabolic systems
35K55 Nonlinear parabolic equations
35K57 Reaction-diffusion equations
35K58 Semilinear parabolic equations
35K59 Quasilinear parabolic equations
35K60 Nonlinear initial value problems for linear parabolic equations
35K61 Nonlinear initial-boundary value problems for nonlinear parabolic equations
35K65 Degenerate parabolic equations
35K67 Singular parabolic equations
35K70 Ultraparabolic equations, pseudoparabolic equations, etc.
35K85 Linear parabolic unilateral problems and linear parabolic variational inequalities [See also 35R35, 49J40]
35K86 Nonlinear parabolic unilateral problems and nonlinear parabolic variational inequalities [See also 35R35, 49J40]
35K87 Systems of parabolic variational inequalities [See also 35R35, 49J40]
35K90 Abstract parabolic equations
35K91 Semilinear parabolic equations with Laplacian, bi-Laplacian or poly-Laplacian
35K92 Quasilinear parabolic equations with p-Laplacian
35K93 Quasilinear parabolic equations with mean curvature operator
35K96 Parabolic Monge-Ampère equations
35K99 None of the above, but in this section

35Lxx **Hyperbolic equations and systems [See also 58J45]**
35L02 First-order hyperbolic equations
35L03 Initial value problems for first-order hyperbolic equations
35L04 Initial-boundary value problems for first-order hyperbolic equations
35L05 Wave equation
35L10 Second-order hyperbolic equations
35L15 Initial value problems for second-order hyperbolic equations
35L20 Initial-boundary value problems for second-order hyperbolic equations
35L25 Higher-order hyperbolic equations
35L30 Initial value problems for higher-order hyperbolic equations

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35L35 Initial-boundary value problems for higher-order hyperbolic equations
35L40 First-order hyperbolic systems
35L45 Initial value problems for first-order hyperbolic systems
35L50 Initial-boundary value problems for first-order hyperbolic systems
35L51 Second-order hyperbolic systems
35L52 Initial value problems for second-order hyperbolic systems
35L53 Initial-boundary value problems for second-order hyperbolic systems
35L55 Higher-order hyperbolic systems
35L56 Initial value problems for higher-order hyperbolic systems
35L57 Initial-boundary value problems for higher-order hyperbolic systems
35L60 Nonlinear first-order hyperbolic equations
35L65 Conservation laws
35L67 Shocks and singularities [See also 58Kxx, 76L05]
35L70 Nonlinear second-order hyperbolic equations
35L71 Semilinear second-order hyperbolic equations
35L72 Quasilinear second-order hyperbolic equations
35L75 Nonlinear higher-order hyperbolic equations
35L76 Semilinear higher-order hyperbolic equations
35L77 Quasilinear higher-order hyperbolic equations
35L80 Degenerate hyperbolic equations
35L81 Singular hyperbolic equations
35L82 Pseudohyperbolic equations
35L85 Linear hyperbolic unilateral problems and linear hyperbolic variational inequalities [See also 35R35, 49J40]
35L86 Nonlinear hyperbolic unilateral problems and nonlinear hyperbolic variational inequalities [See also 35R35, 49J40]
35L87 Unilateral problems and variational inequalities for hyperbolic systems [See also 35R35, 49J40]
35L90 Abstract hyperbolic equations
35L99 None of the above, but in this section
35Mxx **Equations and systems of special type (mixed, composite, etc.)**
35M10 Equations of mixed type
35M11 Initial value problems for equations of mixed type
35M12 Boundary value problems for equations of mixed type
35M13 Initial-boundary value problems for equations of mixed type
35M30 Systems of mixed type
35M31 Initial value problems for systems of mixed type
35M32 Boundary value problems for systems of mixed type
35M33 Initial-boundary value problems for systems of mixed type
35M85 Linear unilateral problems and variational inequalities of mixed type [See also 35R35, 49J40]
35M86 Nonlinear unilateral problems and nonlinear variational inequalities of mixed type [See also 35R35, 49J40]
35M87 Systems of variational inequalities of mixed type [See also 35R35, 49J40]
35M99 None of the above, but in this section
35Nxx **Overdetermined systems [See also 58Hxx, 58J10, 58J15]**
35N05 Overdetermined systems with constant coefficients
35N10 Overdetermined systems with variable coefficients
35N15 $\overline{\partial}$-Neumann problem and generalizations; formal complexes [See also 32W05, 32W10, 58J10]
35N20 Overdetermined initial value problems
35N25 Overdetermined boundary value problems
35N30 Overdetermined initial-boundary value problems
35N99 None of the above, but in this section
35Pxx **Spectral theory and eigenvalue problems [See also 47Axx, 47Bxx, 47F05]**
35P05 General topics in linear spectral theory
35P10 Completeness of eigenfunctions, eigenfunction expansions
35P15 Estimation of eigenvalues, upper and lower bounds
35P20 Asymptotic distribution of eigenvalues and eigenfunctions
35P25 Scattering theory [See also 47A40]
35P30 Nonlinear eigenvalue problems, nonlinear spectral theory
35P99 None of the above, but in this section
35Qxx **Equations of mathematical physics and other areas of application [See also 35J05, 35J10, 35K05, 35L05]**
35Q05 Euler-Poisson-Darboux equations
35Q15 Riemann-Hilbert problems [See also 30E25, 31A25, 31B20]
35Q20 Boltzmann equations
35Q30 Navier-Stokes equations [See also 76D05, 76D07, 76N10]
35Q31 Euler equations [See also 76D05, 76D07, 76N10]
35Q35 PDEs in connection with fluid mechanics
35Q40 PDEs in connection with quantum mechanics
35Q41 Time-dependent Schrödinger equations, Dirac equations
35Q51 Soliton-like equations [See also 37K40]
35Q53 KdV-like equations (Korteweg-de Vries) [See also 37K10]
35Q55 NLS-like equations (nonlinear Schrödinger) [See also 37K10]
35Q56 Ginzburg-Landau equations
35Q60 PDEs in connection with optics and electromagnetic theory
35Q61 Maxwell equations
35Q62 PDEs in connection with statistics
35Q68 PDEs in connection with computer science
35Q70 PDEs in connection with mechanics of particles and systems
35Q74 PDEs in connection with mechanics of deformable solids
35Q75 PDEs in connection with relativity and gravitational theory
35Q76 Einstein equations
35Q79 PDEs in connection with classical thermodynamics and heat transfer
35Q82 PDEs in connection with statistical mechanics
35Q83 Vlasov-like equations
35Q84 Fokker-Planck equations
35Q85 PDEs in connection with astronomy and astrophysics
35Q86 PDEs in connection with geophysics
35Q90 PDEs in connection with mathematical programming
35Q91 PDEs in connection with game theory, economics, social and behavioral sciences
35Q92 PDEs in connection with biology and other natural sciences
35Q93 PDEs in connection with control and optimization
35Q94 PDEs in connection with information and communication
35Q99 None of the above, but in this section
35Rxx **Miscellaneous topics {For equations on manifolds, see 58Jxx; for manifolds of solutions, see 58Bxx; for stochastic PDE, see also 60H15}**
35R01 Partial differential equations on manifolds [See also 32Wxx, 53Cxx, 58Jxx]
35R02 Partial differential equations on graphs and networks (ramified or polygonal spaces)
35R03 Partial differential equations on Heisenberg groups, Lie groups, Carnot groups, etc.
35R05 Partial differential equations with discontinuous coefficients or data
35R06 Partial differential equations with measure
35R09 Integro-partial differential equations [See also 45Kxx]
35R10 Partial functional-differential equations
35R11 Fractional partial differential equations
35R12 Impulsive partial differential equations
35R13 Fuzzy partial differential equations
35R15 Partial differential equations on infinite-dimensional (e.g. function) spaces (= PDE in infinitely many variables) [See also 46Gxx, 58D25]
35R20 Partial operator-differential equations (i.e., PDE on finite-dimensional spaces for abstract space valued functions) [See also 34Gxx, 47A50, 47D03, 47D06, 47D09, 47H20, 47Jxx]
35R25 Improperly posed problems
35R30 Inverse problems
35R35 Free boundary problems
35R37 Moving boundary problems
35R45 Partial differential inequalities
35R50 Partial differential equations of infinite order
35R60 Partial differential equations with randomness, stochastic partial differential equations [See also 60H15]
35R70 Partial differential equations with multivalued right-hand sides
35R99 None of the above, but in this section
35Sxx **Pseudodifferential operators and other generalizations of partial differential operators [See also 47G30, 58J40]**
35S05 Pseudodifferential operators
35S10 Initial value problems for pseudodifferential operators
35S11 Initial-boundary value problems for pseudodifferential operators
35S15 Boundary value problems for pseudodifferential operators
35S30 Fourier integral operators
35S35 Topological aspects: intersection cohomology, stratified sets, etc. [See also 32C38, 32S40, 32S60, 58J15]
35S50 Paradifferential operators
35S99 None of the above, but in this section

37-XX **DYNAMICAL SYSTEMS AND ERGODIC THEORY [See also 26A18, 28Dxx, 34Cxx, 34Dxx, 35Bxx, 46Lxx, 58Jxx, 70-XX]**
37-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
37-01 Instructional exposition (textbooks, tutorial papers, etc.)
37-02 Research exposition (monographs, survey articles)
37-03 Historical (must also be assigned at least one classification number from Section 01)
37-04 Explicit machine computation and programs (not the theory of computation or programming)
37-06 Proceedings, conferences, collections, etc.
37Axx **Ergodic theory [See also 28Dxx]**
37A05 Measure-preserving transformations
37A10 One-parameter continuous families of measure-preserving transformations
37A15 General groups of measure-preserving transformations [See mainly 22Fxx]
37A17 Homogeneous flows [See also 22Fxx]

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37A20 Orbit equivalence, cocycles, ergodic equivalence relations
37A25 Ergodicity, mixing, rates of mixing
37A30 Ergodic theorems, spectral theory, Markov operators {For operator ergodic theory, see mainly 47A35}
37A35 Entropy and other invariants, isomorphism, classification
37A40 Nonsingular (and infinite-measure preserving) transformations
37A45 Relations with number theory and harmonic analysis [See also 11Kxx]
37A50 Relations with probability theory and stochastic processes [See also 60Fxx and 60G10]
37A55 Relations with the theory of C^*-algebras [See mainly 46L55]
37A60 Dynamical systems in statistical mechanics [See also 82Cxx]
37A99 None of the above, but in this section

37Bxx **Topological dynamics [See also 54H20]**
37B05 Transformations and group actions with special properties (minimality, distality, proximality, etc.)
37B10 Symbolic dynamics [See also 37Cxx, 37Dxx]
37B15 Cellular automata [See also 68Q80]
37B20 Notions of recurrence
37B25 Lyapunov functions and stability; attractors, repellers
37B30 Index theory, Morse-Conley indices
37B35 Gradient-like and recurrent behavior; isolated (locally maximal) invariant sets
37B40 Topological entropy
37B45 Continua theory in dynamics
37B50 Multi-dimensional shifts of finite type, tiling dynamics
37B55 Nonautonomous dynamical systems
37B99 None of the above, but in this section

37Cxx **Smooth dynamical systems: general theory [See also 34Cxx, 34Dxx]**
37C05 Smooth mappings and diffeomorphisms
37C10 Vector fields, flows, ordinary differential equations
37C15 Topological and differentiable equivalence, conjugacy, invariants, moduli, classification
37C20 Generic properties, structural stability
37C25 Fixed points, periodic points, fixed-point index theory
37C27 Periodic orbits of vector fields and flows
37C29 Homoclinic and heteroclinic orbits
37C30 Zeta functions, (Ruelle-Frobenius) transfer operators, and other functional analytic techniques in dynamical systems
37C35 Orbit growth
37C40 Smooth ergodic theory, invariant measures [See also 37Dxx]
37C45 Dimension theory of dynamical systems
37C50 Approximate trajectories (pseudotrajectories, shadowing, etc.)
37C55 Periodic and quasiperiodic flows and diffeomorphisms
37C60 Nonautonomous smooth dynamical systems [See also 37B55]
37C65 Monotone flows
37C70 Attractors and repellers, topological structure
37C75 Stability theory
37C80 Symmetries, equivariant dynamical systems
37C85 Dynamics of group actions other than **Z** and **R**, and foliations [See mainly 22Fxx, and also 57R30, 57Sxx]
37C99 None of the above, but in this section

37Dxx **Dynamical systems with hyperbolic behavior**
37D05 Hyperbolic orbits and sets
37D10 Invariant manifold theory
37D15 Morse-Smale systems
37D20 Uniformly hyperbolic systems (expanding, Anosov, Axiom A, etc.)
37D25 Nonuniformly hyperbolic systems (Lyapunov exponents, Pesin theory, etc.)
37D30 Partially hyperbolic systems and dominated splittings
37D35 Thermodynamic formalism, variational principles, equilibrium states
37D40 Dynamical systems of geometric origin and hyperbolicity (geodesic and horocycle flows, etc.)
37D45 Strange attractors, chaotic dynamics
37D50 Hyperbolic systems with singularities (billiards, etc.)
37D99 None of the above, but in this section

37Exx **Low-dimensional dynamical systems**
37E05 Maps of the interval (piecewise continuous, continuous, smooth)
37E10 Maps of the circle
37E15 Combinatorial dynamics (types of periodic orbits)
37E20 Universality, renormalization [See also 37F25]
37E25 Maps of trees and graphs
37E30 Homeomorphisms and diffeomorphisms of planes and surfaces
37E35 Flows on surfaces
37E40 Twist maps
37E45 Rotation numbers and vectors
37E99 None of the above, but in this section

37Fxx **Complex dynamical systems [See also 30D05, 32H50]**
37F05 Relations and correspondences
37F10 Polynomials; rational maps; entire and meromorphic functions [See also 32A10, 32A20, 32H02, 32H04]
37F15 Expanding maps; hyperbolicity; structural stability
37F20 Combinatorics and topology
37F25 Renormalization
37F30 Quasiconformal methods and Teichmüller theory; Fuchsian and Kleinian groups as dynamical systems
37F35 Conformal densities and Hausdorff dimension
37F40 Geometric limits
37F45 Holomorphic families of dynamical systems; the Mandelbrot set; bifurcations
37F50 Small divisors, rotation domains and linearization; Fatou and Julia sets
37F75 Holomorphic foliations and vector fields [See also 32M25, 32S65, 34Mxx]
37F99 None of the above, but in this section

37Gxx **Local and nonlocal bifurcation theory [See also 34C23, 34K18]**
37G05 Normal forms
37G10 Bifurcations of singular points
37G15 Bifurcations of limit cycles and periodic orbits
37G20 Hyperbolic singular points with homoclinic trajectories
37G25 Bifurcations connected with nontransversal intersection
37G30 Infinite nonwandering sets arising in bifurcations
37G35 Attractors and their bifurcations
37G40 Symmetries, equivariant bifurcation theory
37G99 None of the above, but in this section

37Hxx **Random dynamical systems [See also 15B52, 34D08, 34F05, 47B80, 70L05, 82C05, 93Exx]**
37H05 Foundations, general theory of cocycles, algebraic ergodic theory [See also 37Axx]
37H10 Generation, random and stochastic difference and differential equations [See also 34F05, 34K50, 60H10, 60H15]
37H15 Multiplicative ergodic theory, Lyapunov exponents [See also 34D08, 37Axx, 37Cxx, 37Dxx]
37H20 Bifurcation theory [See also 37Gxx]
37H99 None of the above, but in this section

37Jxx **Finite-dimensional Hamiltonian, Lagrangian, contact, and nonholonomic systems [See also 53Dxx, 70Fxx, 70Hxx]**
37J05 General theory, relations with symplectic geometry and topology
37J10 Symplectic mappings, fixed points
37J15 Symmetries, invariants, invariant manifolds, momentum maps, reduction [See also 53D20]
37J20 Bifurcation problems
37J25 Stability problems
37J30 Obstructions to integrability (nonintegrability criteria)
37J35 Completely integrable systems, topological structure of phase space, integration methods
37J40 Perturbations, normal forms, small divisors, KAM theory, Arnol′d diffusion
37J45 Periodic, homoclinic and heteroclinic orbits; variational methods, degree-theoretic methods
37J50 Action-minimizing orbits and measures
37J55 Contact systems [See also 53D10]
37J60 Nonholonomic dynamical systems [See also 70F25]
37J99 None of the above, but in this section

37Kxx **Infinite-dimensional Hamiltonian systems [See also 35Axx, 35Qxx]**
37K05 Hamiltonian structures, symmetries, variational principles, conservation laws
37K10 Completely integrable systems, integrability tests, bi-Hamiltonian structures, hierarchies (KdV, KP, Toda, etc.)
37K15 Integration of completely integrable systems by inverse spectral and scattering methods
37K20 Relations with algebraic geometry, complex analysis, special functions [See also 14H70]
37K25 Relations with differential geometry
37K30 Relations with infinite-dimensional Lie algebras and other algebraic structures
37K35 Lie-Bäcklund and other transformations
37K40 Soliton theory, asymptotic behavior of solutions
37K45 Stability problems
37K50 Bifurcation problems
37K55 Perturbations, KAM for infinite-dimensional systems
37K60 Lattice dynamics [See also 37L60]
37K65 Hamiltonian systems on groups of diffeomorphisms and on manifolds of mappings and metrics
37K99 None of the above, but in this section

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37Lxx **Infinite-dimensional dissipative dynamical systems [See also 35Bxx, 35Qxx]**
37L05 General theory, nonlinear semigroups, evolution equations
37L10 Normal forms, center manifold theory, bifurcation theory
37L15 Stability problems
37L20 Symmetries
37L25 Inertial manifolds and other invariant attracting sets
37L30 Attractors and their dimensions, Lyapunov exponents
37L40 Invariant measures
37L45 Hyperbolicity; Lyapunov functions
37L50 Noncompact semigroups; dispersive equations; perturbations of Hamiltonian systems
37L55 Infinite-dimensional random dynamical systems; stochastic equations [See also 35R60, 60H10, 60H15]
37L60 Lattice dynamics [See also 37K60]
37L65 Special approximation methods (nonlinear Galerkin, etc.)
37L99 None of the above, but in this section
37Mxx **Approximation methods and numerical treatment of dynamical systems [See also 65Pxx]**
37M05 Simulation
37M10 Time series analysis
37M15 Symplectic integrators
37M20 Computational methods for bifurcation problems
37M25 Computational methods for ergodic theory (approximation of invariant measures, computation of Lyapunov exponents, entropy)
37M99 None of the above, but in this section
37Nxx **Applications**
37N05 Dynamical systems in classical and celestial mechanics [See mainly 70Fxx, 70Hxx, 70Kxx]
37N10 Dynamical systems in fluid mechanics, oceanography and meteorology [See mainly 76–XX, especially 76D05, 76F20, 86A05, 86A10]
37N15 Dynamical systems in solid mechanics [See mainly 74Hxx]
37N20 Dynamical systems in other branches of physics (quantum mechanics, general relativity, laser physics)
37N25 Dynamical systems in biology [See mainly 92–XX, but also 91–XX]
37N30 Dynamical systems in numerical analysis
37N35 Dynamical systems in control
37N40 Dynamical systems in optimization and economics
37N99 None of the above, but in this section
37Pxx **Arithmetic and non-Archimedean dynamical systems [See also 11S82, 37A45]**
37P05 Polynomial and rational maps
37P10 Analytic and meromorphic maps
37P15 Global ground fields
37P20 Non-Archimedean local ground fields
37P25 Finite ground fields
37P30 Height functions; Green functions; invariant measures [See also 11G50, 14G40]
37P35 Arithmetic properties of periodic points
37P40 Non-Archimedean Fatou and Julia sets
37P45 Families and moduli spaces
37P50 Dynamical systems on Berkovich spaces
37P55 Arithmetic dynamics on general algebraic varieties
37P99 None of the above, but in this section

39-XX **DIFFERENCE AND FUNCTIONAL EQUATIONS**
39-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
39-01 Instructional exposition (textbooks, tutorial papers, etc.)
39-02 Research exposition (monographs, survey articles)
39-03 Historical (must also be assigned at least one classification number from Section 01)
39-04 Explicit machine computation and programs (not the theory of computation or programming)
39-06 Proceedings, conferences, collections, etc.
39Axx **Difference equations {For dynamical systems, see 37–XX; for dynamic equations on time scales, see 34N05}**
39A05 General theory
39A06 Linear equations
39A10 Difference equations, additive
39A12 Discrete version of topics in analysis
39A13 Difference equations, scaling (q-differences) [See also 33Dxx]
39A14 Partial difference equations
39A20 Multiplicative and other generalized difference equations, e.g. of Lyness type
39A21 Oscillation theory
39A22 Growth, boundedness, comparison of solutions
39A23 Periodic solutions
39A24 Almost periodic solutions
39A28 Bifurcation theory
39A30 Stability theory
39A33 Complex (chaotic) behavior of solutions
39A45 Equations in the complex domain
39A50 Stochastic difference equations
39A60 Applications
39A70 Difference operators [See also 47B39]
39A99 None of the above, but in this section
39Bxx **Functional equations and inequalities [See also 30D05]**
39B05 General
39B12 Iteration theory, iterative and composite equations [See also 26A18, 30D05, 37–XX]
39B22 Equations for real functions [See also 26A51, 26B25]
39B32 Equations for complex functions [See also 30D05]
39B42 Matrix and operator equations [See also 47Jxx]
39B52 Equations for functions with more general domains and/or ranges
39B55 Orthogonal additivity and other conditional equations
39B62 Functional inequalities, including subadditivity, convexity, etc. [See also 26A51, 26B25, 26Dxx]
39B72 Systems of functional equations and inequalities
39B82 Stability, separation, extension, and related topics [See also 46A22]
39B99 None of the above, but in this section

40-XX **SEQUENCES, SERIES, SUMMABILITY**
40-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
40-01 Instructional exposition (textbooks, tutorial papers, etc.)
40-02 Research exposition (monographs, survey articles)
40-03 Historical (must also be assigned at least one classification number from Section 01)
40-04 Explicit machine computation and programs (not the theory of computation or programming)
40-06 Proceedings, conferences, collections, etc.
40Axx **Convergence and divergence of infinite limiting processes**
40A05 Convergence and divergence of series and sequences
40A10 Convergence and divergence of integrals
40A15 Convergence and divergence of continued fractions [See also 30B70]
40A20 Convergence and divergence of infinite products
40A25 Approximation to limiting values (summation of series, etc.) {For the Euler-Maclaurin summation formula, see 65B15}
40A30 Convergence and divergence of series and sequences of functions
40A35 Ideal and statistical convergence [See also 40G15]
40A99 None of the above, but in this section
40Bxx **Multiple sequences and series**
40B05 Multiple sequences and series (should also be assigned at least one other classification number in this section)
40B99 None of the above, but in this section
40Cxx **General summability methods**
40C05 Matrix methods
40C10 Integral methods
40C15 Function-theoretic methods (including power series methods and semicontinuous methods)
40C99 None of the above, but in this section
40Dxx **Direct theorems on summability**
40D05 General theorems
40D09 Structure of summability fields
40D10 Tauberian constants and oscillation limits
40D15 Convergence factors and summability factors
40D20 Summability and bounded fields of methods
40D25 Inclusion and equivalence theorems
40D99 None of the above, but in this section
40Exx **Inversion theorems**
40E05 Tauberian theorems, general
40E10 Growth estimates
40E15 Lacunary inversion theorems
40E20 Tauberian constants
40E99 None of the above, but in this section
40Fxx **Absolute and strong summability (should also be assigned at least one other classification number in Section 40)**
40F05 Absolute and strong summability (should also be assigned at least one other classification number in Section 40)
40F99 None of the above, but in this section
40Gxx **Special methods of summability**
40G05 Cesàro, Euler, Nörlund and Hausdorff methods
40G10 Abel, Borel and power series methods
40G15 Summability methods using statistical convergence [See also 40A35]
40G99 None of the above, but in this section
40Hxx **Functional analytic methods in summability**
40H05 Functional analytic methods in summability
40H99 None of the above, but in this section

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40Jxx **Summability in abstract structures [See also 43A55, 46A35, 46B15]**
40J05 Summability in abstract structures [See also 43A55, 46A35, 46B15] (should also be assigned at least one other classification number in this section)
40J99 None of the above, but in this section

41-XX **APPROXIMATIONS AND EXPANSIONS {For all approximation theory in the complex domain, see 30E05 and 30E10; for all trigonometric approximation and interpolation, see 42A10 and 42A15; for numerical approximation, see 65Dxx}**
41-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
41-01 Instructional exposition (textbooks, tutorial papers, etc.)
41-02 Research exposition (monographs, survey articles)
41-03 Historical (must also be assigned at least one classification number from Section 01)
41-04 Explicit machine computation and programs (not the theory of computation or programming)
41-06 Proceedings, conferences, collections, etc.
41Axx **Approximations and expansions {For all approximation theory in the complex domain, see 30E05 and 30E10; for all trigonometric approximation and interpolation, see 42A10 and 42A15; for numerical approximation, see 65Dxx}**
41A05 Interpolation [See also 42A15 and 65D05]
41A10 Approximation by polynomials {For approximation by trigonometric polynomials, see 42A10}
41A15 Spline approximation
41A17 Inequalities in approximation (Bernstein, Jackson, Nikol′skiĭ-type inequalities)
41A20 Approximation by rational functions
41A21 Padé approximation
41A25 Rate of convergence, degree of approximation
41A27 Inverse theorems
41A28 Simultaneous approximation
41A29 Approximation with constraints
41A30 Approximation by other special function classes
41A35 Approximation by operators (in particular, by integral operators)
41A36 Approximation by positive operators
41A40 Saturation
41A44 Best constants
41A45 Approximation by arbitrary linear expressions
41A46 Approximation by arbitrary nonlinear expressions; widths and entropy
41A50 Best approximation, Chebyshev systems
41A52 Uniqueness of best approximation
41A55 Approximate quadratures
41A58 Series expansions (e.g. Taylor, Lidstone series, but not Fourier series)
41A60 Asymptotic approximations, asymptotic expansions (steepest descent, etc.) [See also 30E15]
41A63 Multidimensional problems (should also be assigned at least one other classification number in this section)
41A65 Abstract approximation theory (approximation in normed linear spaces and other abstract spaces)
41A80 Remainders in approximation formulas
41A99 None of the above, but in this section

42-XX **HARMONIC ANALYSIS ON EUCLIDEAN SPACES**
42-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
42-01 Instructional exposition (textbooks, tutorial papers, etc.)
42-02 Research exposition (monographs, survey articles)
42-03 Historical (must also be assigned at least one classification number from Section 01)
42-04 Explicit machine computation and programs (not the theory of computation or programming)
42-06 Proceedings, conferences, collections, etc.
42Axx **Harmonic analysis in one variable**
42A05 Trigonometric polynomials, inequalities, extremal problems
42A10 Trigonometric approximation
42A15 Trigonometric interpolation
42A16 Fourier coefficients, Fourier series of functions with special properties, special Fourier series {For automorphic theory, see mainly 11F30}
42A20 Convergence and absolute convergence of Fourier and trigonometric series
42A24 Summability and absolute summability of Fourier and trigonometric series
42A32 Trigonometric series of special types (positive coefficients, monotonic coefficients, etc.)
42A38 Fourier and Fourier-Stieltjes transforms and other transforms of Fourier type
42A45 Multipliers
42A50 Conjugate functions, conjugate series, singular integrals
42A55 Lacunary series of trigonometric and other functions; Riesz products
42A61 Probabilistic methods
42A63 Uniqueness of trigonometric expansions, uniqueness of Fourier expansions, Riemann theory, localization
42A65 Completeness of sets of functions
42A70 Trigonometric moment problems
42A75 Classical almost periodic functions, mean periodic functions [See also 43A60]
42A82 Positive definite functions
42A85 Convolution, factorization
42A99 None of the above, but in this section
42Bxx **Harmonic analysis in several variables {For automorphic theory, see mainly 11F30}**
42B05 Fourier series and coefficients
42B08 Summability
42B10 Fourier and Fourier-Stieltjes transforms and other transforms of Fourier type
42B15 Multipliers
42B20 Singular and oscillatory integrals (Calderón-Zygmund, etc.)
42B25 Maximal functions, Littlewood-Paley theory
42B30 H^p-spaces
42B35 Function spaces arising in harmonic analysis
42B37 Harmonic analysis and PDE [See also 35–XX]
42B99 None of the above, but in this section
42Cxx **Nontrigonometric harmonic analysis**
42C05 Orthogonal functions and polynomials, general theory [See also 33C45, 33C50, 33D45]
42C10 Fourier series in special orthogonal functions (Legendre polynomials, Walsh functions, etc.)
42C15 General harmonic expansions, frames
42C20 Other transformations of harmonic type
42C25 Uniqueness and localization for orthogonal series
42C30 Completeness of sets of functions
42C40 Wavelets and other special systems
42C99 None of the above, but in this section

43-XX **ABSTRACT HARMONIC ANALYSIS {For other analysis on topological and Lie groups, see 22Exx}**
43-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
43-01 Instructional exposition (textbooks, tutorial papers, etc.)
43-02 Research exposition (monographs, survey articles)
43-03 Historical (must also be assigned at least one classification number from Section 01)
43-04 Explicit machine computation and programs (not the theory of computation or programming)
43-06 Proceedings, conferences, collections, etc.
43Axx **Abstract harmonic analysis {For other analysis on topological and Lie groups, see 22Exx}**
43A05 Measures on groups and semigroups, etc.
43A07 Means on groups, semigroups, etc.; amenable groups
43A10 Measure algebras on groups, semigroups, etc.
43A15 L^p-spaces and other function spaces on groups, semigroups, etc.
43A17 Analysis on ordered groups, H^p-theory
43A20 L^1-algebras on groups, semigroups, etc.
43A22 Homomorphisms and multipliers of function spaces on groups, semigroups, etc.
43A25 Fourier and Fourier-Stieltjes transforms on locally compact and other abelian groups
43A30 Fourier and Fourier-Stieltjes transforms on nonabelian groups and on semigroups, etc.
43A32 Other transforms and operators of Fourier type
43A35 Positive definite functions on groups, semigroups, etc.
43A40 Character groups and dual objects
43A45 Spectral synthesis on groups, semigroups, etc.
43A46 Special sets (thin sets, Kronecker sets, Helson sets, Ditkin sets, Sidon sets, etc.)
43A50 Convergence of Fourier series and of inverse transforms
43A55 Summability methods on groups, semigroups, etc. [See also 40J05]
43A60 Almost periodic functions on groups and semigroups and their generalizations (recurrent functions, distal functions, etc.); almost automorphic functions
43A62 Hypergroups
43A65 Representations of groups, semigroups, etc. [See also 22A10, 22A20, 22Dxx, 22E45]
43A70 Analysis on specific locally compact and other abelian groups [See also 11R56, 22B05]
43A75 Analysis on specific compact groups
43A77 Analysis on general compact groups
43A80 Analysis on other specific Lie groups [See also 22Exx]

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43A85 Analysis on homogeneous spaces
43A90 Spherical functions [See also 22E45, 22E46, 33C55]
43A95 Categorical methods [See also 46Mxx]
43A99 None of the above, but in this section

44-XX **INTEGRAL TRANSFORMS, OPERATIONAL CALCULUS** {**For fractional derivatives and integrals, see 26A33. For Fourier transforms, see 42A38, 42B10. For integral transforms in distribution spaces, see 46F12. For numerical methods, see 65R10**}
44-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
44-01 Instructional exposition (textbooks, tutorial papers, etc.)
44-02 Research exposition (monographs, survey articles)
44-03 Historical (must also be assigned at least one classification number from Section 01)
44-04 Explicit machine computation and programs (not the theory of computation or programming)
44-06 Proceedings, conferences, collections, etc.
44Axx **Integral transforms, operational calculus** {**For fractional derivatives and integrals, see 26A33. For Fourier transforms, see 42A38, 42B10. For integral transforms in distribution spaces, see 46F12. For numerical methods, see 65R10**}
44A05 General transforms [See also 42A38]
44A10 Laplace transform
44A12 Radon transform [See also 92C55]
44A15 Special transforms (Legendre, Hilbert, etc.)
44A20 Transforms of special functions
44A30 Multiple transforms
44A35 Convolution
44A40 Calculus of Mikusiński and other operational calculi
44A45 Classical operational calculus
44A55 Discrete operational calculus
44A60 Moment problems
44A99 None of the above, but in this section

45-XX **INTEGRAL EQUATIONS**
45-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
45-01 Instructional exposition (textbooks, tutorial papers, etc.)
45-02 Research exposition (monographs, survey articles)
45-03 Historical (must also be assigned at least one classification number from Section 01)
45-04 Explicit machine computation and programs (not the theory of computation or programming)
45-06 Proceedings, conferences, collections, etc.
45Axx **Linear integral equations**
45A05 Linear integral equations
45A99 None of the above, but in this section
45Bxx **Fredholm integral equations**
45B05 Fredholm integral equations
45B99 None of the above, but in this section
45Cxx **Eigenvalue problems [See also 34Lxx, 35Pxx, 45P05, 47A75]**
45C05 Eigenvalue problems [See also 34Lxx, 35Pxx, 45P05, 47A75]
45C99 None of the above, but in this section
45Dxx **Volterra integral equations [See also 34A12]**
45D05 Volterra integral equations [See also 34A12]
45D99 None of the above, but in this section
45Exx **Singular integral equations [See also 30E20, 30E25, 44A15, 44A35]**
45E05 Integral equations with kernels of Cauchy type [See also 35J15]
45E10 Integral equations of the convolution type (Abel, Picard, Toeplitz and Wiener-Hopf type) [See also 47B35]
45E99 None of the above, but in this section
45Fxx **Systems of linear integral equations**
45F05 Systems of nonsingular linear integral equations
45F10 Dual, triple, etc., integral and series equations
45F15 Systems of singular linear integral equations
45F99 None of the above, but in this section
45Gxx **Nonlinear integral equations [See also 47H30, 47Jxx]**
45G05 Singular nonlinear integral equations
45G10 Other nonlinear integral equations
45G15 Systems of nonlinear integral equations
45G99 None of the above, but in this section
45Hxx **Miscellaneous special kernels [See also 44A15]**
45H05 Miscellaneous special kernels [See also 44A15]
45H99 None of the above, but in this section
45Jxx **Integro-ordinary differential equations [See also 34K05, 34K30, 47G20]**
45J05 Integro-ordinary differential equations [See also 34K05, 34K30, 47G20]
45J99 None of the above, but in this section
45Kxx **Integro-partial differential equations [See also 34K30, 35R09, 35R10, 47G20]**
45K05 Integro-partial differential equations [See also 34K30, 35R09, 35R10, 47G20]
45K99 None of the above, but in this section
45Lxx **Theoretical approximation of solutions** {**For numerical analysis, see 65Rxx**}
45L05 Theoretical approximation of solutions {For numerical analysis, see 65Rxx}
45L99 None of the above, but in this section
45Mxx **Qualitative behavior**
45M05 Asymptotics
45M10 Stability theory
45M15 Periodic solutions
45M20 Positive solutions
45M99 None of the above, but in this section
45Nxx **Abstract integral equations, integral equations in abstract spaces**
45N05 Abstract integral equations, integral equations in abstract spaces
45N99 None of the above, but in this section
45Pxx **Integral operators [See also 47B38, 47G10]**
45P05 Integral operators [See also 47B38, 47G10]
45P99 None of the above, but in this section
45Qxx **Inverse problems**
45Q05 Inverse problems
45Q99 None of the above, but in this section
45Rxx **Random integral equations [See also 60H20]**
45R05 Random integral equations [See also 60H20]
45R99 None of the above, but in this section

46-XX **FUNCTIONAL ANALYSIS** {**For manifolds modeled on topological linear spaces, see 57Nxx, 58Bxx**}
46-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
46-01 Instructional exposition (textbooks, tutorial papers, etc.)
46-02 Research exposition (monographs, survey articles)
46-03 Historical (must also be assigned at least one classification number from Section 01)
46-04 Explicit machine computation and programs (not the theory of computation or programming)
46-06 Proceedings, conferences, collections, etc.
46Axx **Topological linear spaces and related structures** {**For function spaces, see 46Exx**}
46A03 General theory of locally convex spaces
46A04 Locally convex Fréchet spaces and (DF)-spaces
46A08 Barrelled spaces, bornological spaces
46A11 Spaces determined by compactness or summability properties (nuclear spaces, Schwartz spaces, Montel spaces, etc.)
46A13 Spaces defined by inductive or projective limits (LB, LF, etc.) [See also 46M40]
46A16 Not locally convex spaces (metrizable topological linear spaces, locally bounded spaces, quasi-Banach spaces, etc.)
46A17 Bornologies and related structures; Mackey convergence, etc.
46A19 Other "topological" linear spaces (convergence spaces, ranked spaces, spaces with a metric taking values in an ordered structure more general than **R**, etc.)
46A20 Duality theory
46A22 Theorems of Hahn-Banach type; extension and lifting of functionals and operators [See also 46M10]
46A25 Reflexivity and semi-reflexivity [See also 46B10]
46A30 Open mapping and closed graph theorems; completeness (including B-, B_r-completeness)
46A32 Spaces of linear operators; topological tensor products; approximation properties [See also 46B28, 46M05, 47L05, 47L20]
46A35 Summability and bases [See also 46B15]
46A40 Ordered topological linear spaces, vector lattices [See also 06F20, 46B40, 46B42]
46A45 Sequence spaces (including Köthe sequence spaces) [See also 46B45]
46A50 Compactness in topological linear spaces; angelic spaces, etc.
46A55 Convex sets in topological linear spaces; Choquet theory [See also 52A07]
46A61 Graded Fréchet spaces and tame operators
46A63 Topological invariants ((DN), (Ω), etc.)
46A70 Saks spaces and their duals (strict topologies, mixed topologies, two-norm spaces, co-Saks spaces, etc.)
46A80 Modular spaces
46A99 None of the above, but in this section
46Bxx **Normed linear spaces and Banach spaces; Banach lattices** {**For function spaces, see 46Exx**}
46B03 Isomorphic theory (including renorming) of Banach spaces
46B04 Isometric theory of Banach spaces
46B06 Asymptotic theory of Banach spaces [See also 52A23]

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46B07 Local theory of Banach spaces
46B08 Ultraproduct techniques in Banach space theory [See also 46M07]
46B09 Probabilistic methods in Banach space theory [See also 60Bxx]
46B10 Duality and reflexivity [See also 46A25]
46B15 Summability and bases [See also 46A35]
46B20 Geometry and structure of normed linear spaces
46B22 Radon-Nikodým, Kreĭn-Milman and related properties [See also 46G10]
46B25 Classical Banach spaces in the general theory
46B26 Nonseparable Banach spaces
46B28 Spaces of operators; tensor products; approximation properties [See also 46A32, 46M05, 47L05, 47L20]
46B40 Ordered normed spaces [See also 46A40, 46B42]
46B42 Banach lattices [See also 46A40, 46B40]
46B45 Banach sequence spaces [See also 46A45]
46B50 Compactness in Banach (or normed) spaces
46B70 Interpolation between normed linear spaces [See also 46M35]
46B80 Nonlinear classification of Banach spaces; nonlinear quotients
46B85 Embeddings of discrete metric spaces into Banach spaces; applications in topology and computer science [See also 05C12, 68Rxx]
46B99 None of the above, but in this section

46Cxx **Inner product spaces and their generalizations, Hilbert spaces {For function spaces, see 46Exx}**
46C05 Hilbert and pre-Hilbert spaces: geometry and topology (including spaces with semidefinite inner product)
46C07 Hilbert subspaces (= operator ranges); complementation (Aronszajn, de Branges, etc.) [See also 46B70, 46M35]
46C15 Characterizations of Hilbert spaces
46C20 Spaces with indefinite inner product (Kreĭn spaces, Pontryagin spaces, etc.) [See also 47B50]
46C50 Generalizations of inner products (semi-inner products, partial inner products, etc.)
46C99 None of the above, but in this section

46Exx **Linear function spaces and their duals [See also 30H05, 32A38, 46F05] {For function algebras, see 46J10}**
46E05 Lattices of continuous, differentiable or analytic functions
46E10 Topological linear spaces of continuous, differentiable or analytic functions
46E15 Banach spaces of continuous, differentiable or analytic functions
46E20 Hilbert spaces of continuous, differentiable or analytic functions
46E22 Hilbert spaces with reproducing kernels (= [proper] functional Hilbert spaces, including de Branges-Rovnyak and other structured spaces) [See also 47B32]
46E25 Rings and algebras of continuous, differentiable or analytic functions {For Banach function algebras, see 46J10, 46J15}
46E27 Spaces of measures [See also 28A33, 46Gxx]
46E30 Spaces of measurable functions (L^p-spaces, Orlicz spaces, Köthe function spaces, Lorentz spaces, rearrangement invariant spaces, ideal spaces, etc.)
46E35 Sobolev spaces and other spaces of "smooth" functions, embedding theorems, trace theorems
46E39 Sobolev (and similar kinds of) spaces of functions of discrete variables
46E40 Spaces of vector- and operator-valued functions
46E50 Spaces of differentiable or holomorphic functions on infinite-dimensional spaces [See also 46G20, 46G25, 47H60]
46E99 None of the above, but in this section

46Fxx **Distributions, generalized functions, distribution spaces [See also 46T30]**
46F05 Topological linear spaces of test functions, distributions and ultradistributions [See also 46E10, 46E35]
46F10 Operations with distributions
46F12 Integral transforms in distribution spaces [See also 42–XX, 44–XX]
46F15 Hyperfunctions, analytic functionals [See also 32A25, 32A45, 32C35, 58J15]
46F20 Distributions and ultradistributions as boundary values of analytic functions [See also 30D40, 30E25, 32A40]
46F25 Distributions on infinite-dimensional spaces [See also 58C35]
46F30 Generalized functions for nonlinear analysis (Rosinger, Colombeau, nonstandard, etc.)
46F99 None of the above, but in this section

46Gxx **Measures, integration, derivative, holomorphy (all involving infinite-dimensional spaces) [See also 28–XX, 46Txx]**
46G05 Derivatives [See also 46T20, 58C20, 58C25]
46G10 Vector-valued measures and integration [See also 28Bxx, 46B22]
46G12 Measures and integration on abstract linear spaces [See also 28C20, 46T12]
46G15 Functional analytic lifting theory [See also 28A51]
46G20 Infinite-dimensional holomorphy [See also 32–XX, 46E50, 46T25, 58B12, 58C10]
46G25 (Spaces of) multilinear mappings, polynomials [See also 46E50, 46G20, 47H60]
46G99 None of the above, but in this section

46Hxx **Topological algebras, normed rings and algebras, Banach algebras {For group algebras, convolution algebras and measure algebras, see 43A10, 43A20}**
46H05 General theory of topological algebras
46H10 Ideals and subalgebras
46H15 Representations of topological algebras
46H20 Structure, classification of topological algebras
46H25 Normed modules and Banach modules, topological modules (if not placed in 13–XX or 16–XX)
46H30 Functional calculus in topological algebras [See also 47A60]
46H35 Topological algebras of operators [See mainly 47Lxx]
46H40 Automatic continuity
46H70 Nonassociative topological algebras [See also 46K70, 46L70]
46H99 None of the above, but in this section

46Jxx **Commutative Banach algebras and commutative topological algebras [See also 46E25]**
46J05 General theory of commutative topological algebras
46J10 Banach algebras of continuous functions, function algebras [See also 46E25]
46J15 Banach algebras of differentiable or analytic functions, H^p-spaces [See also 30H10, 32A35, 32A37, 32A38, 42B30]
46J20 Ideals, maximal ideals, boundaries
46J25 Representations of commutative topological algebras
46J30 Subalgebras
46J40 Structure, classification of commutative topological algebras
46J45 Radical Banach algebras
46J99 None of the above, but in this section

46Kxx **Topological (rings and) algebras with an involution [See also 16W10]**
46K05 General theory of topological algebras with involution
46K10 Representations of topological algebras with involution
46K15 Hilbert algebras
46K50 Nonselfadjoint (sub)algebras in algebras with involution
46K70 Nonassociative topological algebras with an involution [See also 46H70, 46L70]
46K99 None of the above, but in this section

46Lxx **Selfadjoint operator algebras (C^*-algebras, von Neumann (W^*-) algebras, etc.) [See also 22D25, 47Lxx]**
46L05 General theory of C^*-algebras
46L06 Tensor products of C^*-algebras
46L07 Operator spaces and completely bounded maps [See also 47L25]
46L08 C^*-modules
46L09 Free products of C^*-algebras
46L10 General theory of von Neumann algebras
46L30 States
46L35 Classifications of C^*-algebras
46L36 Classification of factors
46L37 Subfactors and their classification
46L40 Automorphisms
46L45 Decomposition theory for C^*-algebras
46L51 Noncommutative measure and integration
46L52 Noncommutative function spaces
46L53 Noncommutative probability and statistics
46L54 Free probability and free operator algebras
46L55 Noncommutative dynamical systems [See also 28Dxx, 37Kxx, 37Lxx, 54H20]
46L57 Derivations, dissipations and positive semigroups in C^*-algebras
46L60 Applications of selfadjoint operator algebras to physics [See also 46N50, 46N55, 47L90, 81T05, 82B10, 82C10]
46L65 Quantizations, deformations
46L70 Nonassociative selfadjoint operator algebras [See also 46H70, 46K70]
46L80 K-theory and operator algebras (including cyclic theory) [See also 18F25, 19Kxx, 46M20, 55Rxx, 58J22]
46L85 Noncommutative topology [See also 58B32, 58B34, 58J22]
46L87 Noncommutative differential geometry [See also 58B32, 58B34, 58J22]
46L89 Other "noncommutative" mathematics based on C^*-algebra theory [See also 58B32, 58B34, 58J22]
46L99 None of the above, but in this section

46Mxx **Methods of category theory in functional analysis [See also 18–XX]**
46M05 Tensor products [See also 46A32, 46B28, 47A80]
46M07 Ultraproducts [See also 46B08, 46S20]
46M10 Projective and injective objects [See also 46A22]
46M15 Categories, functors {For K-theory, EXT, etc., see 19K33, 46L80, 46M18, 46M20}
46M18 Homological methods (exact sequences, right inverses, lifting, etc.)

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46M20 Methods of algebraic topology (cohomology, sheaf and bundle theory, etc.) [See also 14F05, 18Fxx, 19Kxx, 32Cxx, 32Lxx, 46L80, 46M15, 46M18, 55Rxx]
46M35 Abstract interpolation of topological vector spaces [See also 46B70]
46M40 Inductive and projective limits [See also 46A13]
46M99 None of the above, but in this section
46Nxx **Miscellaneous applications of functional analysis [See also 47Nxx]**
46N10 Applications in optimization, convex analysis, mathematical programming, economics
46N20 Applications to differential and integral equations
46N30 Applications in probability theory and statistics
46N40 Applications in numerical analysis [See also 65Jxx]
46N50 Applications in quantum physics
46N55 Applications in statistical physics
46N60 Applications in biology and other sciences
46N99 None of the above, but in this section
46Sxx **Other (nonclassical) types of functional analysis [See also 47Sxx]**
46S10 Functional analysis over fields other than **R** or **C** or the quaternions; non-Archimedean functional analysis [See also 12J25, 32P05]
46S20 Nonstandard functional analysis [See also 03H05]
46S30 Constructive functional analysis [See also 03F60]
46S40 Fuzzy functional analysis [See also 03E72]
46S50 Functional analysis in probabilistic metric linear spaces
46S60 Functional analysis on superspaces (supermanifolds) or graded spaces [See also 58A50 and 58C50]
46S99 None of the above, but in this section
46Txx **Nonlinear functional analysis [See also 47Hxx, 47Jxx, 58Cxx, 58Dxx]**
46T05 Infinite-dimensional manifolds [See also 53Axx, 57N20, 58Bxx, 58Dxx]
46T10 Manifolds of mappings
46T12 Measure (Gaussian, cylindrical, etc.) and integrals (Feynman, path, Fresnel, etc.) on manifolds [See also 28Cxx, 46G12, 60–XX]
46T20 Continuous and differentiable maps [See also 46G05]
46T25 Holomorphic maps [See also 46G20]
46T30 Distributions and generalized functions on nonlinear spaces [See also 46Fxx]
46T99 None of the above, but in this section

47-XX **OPERATOR THEORY**
47-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
47-01 Instructional exposition (textbooks, tutorial papers, etc.)
47-02 Research exposition (monographs, survey articles)
47-03 Historical (must also be assigned at least one classification number from Section 01)
47-04 Explicit machine computation and programs (not the theory of computation or programming)
47-06 Proceedings, conferences, collections, etc.
47Axx **General theory of linear operators**
47A05 General (adjoints, conjugates, products, inverses, domains, ranges, etc.)
47A06 Linear relations (multivalued linear operators)
47A07 Forms (bilinear, sesquilinear, multilinear)
47A10 Spectrum, resolvent
47A11 Local spectral properties
47A12 Numerical range, numerical radius
47A13 Several-variable operator theory (spectral, Fredholm, etc.)
47A15 Invariant subspaces [See also 47A46]
47A16 Cyclic vectors, hypercyclic and chaotic operators
47A20 Dilations, extensions, compressions
47A25 Spectral sets
47A30 Norms (inequalities, more than one norm, etc.)
47A35 Ergodic theory [See also 28Dxx, 37Axx]
47A40 Scattering theory [See also 34L25, 35P25, 37K15, 58J50, 81Uxx]
47A45 Canonical models for contractions and nonselfadjoint operators
47A46 Chains (nests) of projections or of invariant subspaces, integrals along chains, etc.
47A48 Operator colligations (= nodes), vessels, linear systems, characteristic functions, realizations, etc.
47A50 Equations and inequalities involving linear operators, with vector unknowns
47A52 Ill-posed problems, regularization [See also 35R25, 47J06, 65F22, 65J20, 65L08, 65M30, 65R30]
47A53 (Semi-) Fredholm operators; index theories [See also 58B15, 58J20]
47A55 Perturbation theory [See also 47H14, 58J37, 70H09, 81Q15]
47A56 Functions whose values are linear operators (operator and matrix valued functions, etc., including analytic and meromorphic ones)
47A57 Operator methods in interpolation, moment and extension problems [See also 30E05, 42A70, 42A82, 44A60]
47A58 Operator approximation theory
47A60 Functional calculus
47A62 Equations involving linear operators, with operator unknowns
47A63 Operator inequalities
47A64 Operator means, shorted operators, etc.
47A65 Structure theory
47A66 Quasitriangular and nonquasitriangular, quasidiagonal and nonquasidiagonal operators
47A67 Representation theory
47A68 Factorization theory (including Wiener-Hopf and spectral factorizations)
47A70 (Generalized) eigenfunction expansions; rigged Hilbert spaces
47A75 Eigenvalue problems [See also 47J10, 49R05]
47A80 Tensor products of operators [See also 46M05]
47A99 None of the above, but in this section
47Bxx **Special classes of linear operators**
47B06 Riesz operators; eigenvalue distributions; approximation numbers, s-numbers, Kolmogorov numbers, entropy numbers, etc. of operators
47B07 Operators defined by compactness properties
47B10 Operators belonging to operator ideals (nuclear, p-summing, in the Schatten-von Neumann classes, etc.) [See also 47L20]
47B15 Hermitian and normal operators (spectral measures, functional calculus, etc.)
47B20 Subnormal operators, hyponormal operators, etc.
47B25 Symmetric and selfadjoint operators (unbounded)
47B32 Operators in reproducing-kernel Hilbert spaces (including de Branges, de Branges-Rovnyak, and other structured spaces) [See also 46E22]
47B33 Composition operators
47B34 Kernel operators
47B35 Toeplitz operators, Hankel operators, Wiener-Hopf operators [See also 45P05, 47G10 for other integral operators; see also 32A25, 32M15]
47B36 Jacobi (tridiagonal) operators (matrices) and generalizations
47B37 Operators on special spaces (weighted shifts, operators on sequence spaces, etc.)
47B38 Operators on function spaces (general)
47B39 Difference operators [See also 39A70]
47B40 Spectral operators, decomposable operators, well-bounded operators, etc.
47B44 Accretive operators, dissipative operators, etc.
47B47 Commutators, derivations, elementary operators, etc.
47B48 Operators on Banach algebras
47B49 Transformers, preservers (operators on spaces of operators)
47B50 Operators on spaces with an indefinite metric [See also 46C50]
47B60 Operators on ordered spaces
47B65 Positive operators and order-bounded operators
47B80 Random operators [See also 47H40, 60H25]
47B99 None of the above, but in this section
47Cxx **Individual linear operators as elements of algebraic systems**
47C05 Operators in algebras
47C10 Operators in *-algebras
47C15 Operators in C^*- or von Neumann algebras
47C99 None of the above, but in this section
47Dxx **Groups and semigroups of linear operators, their generalizations and applications**
47D03 Groups and semigroups of linear operators {For nonlinear operators, see 47H20; see also 20M20}
47D06 One-parameter semigroups and linear evolution equations [See also 34G10, 34K30]
47D07 Markov semigroups and applications to diffusion processes {For Markov processes, see 60Jxx}
47D08 Schrödinger and Feynman-Kac semigroups
47D09 Operator sine and cosine functions and higher-order Cauchy problems [See also 34G10]
47D60 C-semigroups, regularized semigroups
47D62 Integrated semigroups
47D99 None of the above, but in this section
47Exx **Ordinary differential operators [See also 34Bxx, 34Lxx]**
47E05 Ordinary differential operators [See also 34Bxx, 34Lxx] (should also be assigned at least one other classification number in section 47)
47E99 None of the above, but in this section
47Fxx **Partial differential operators [See also 35Pxx, 58Jxx]**
47F05 Partial differential operators [See also 35Pxx, 58Jxx] (should also be assigned at least one other classification number in section 47)
47F99 None of the above, but in this section
47Gxx **Integral, integro-differential, and pseudodifferential operators [See also 58Jxx]**
47G10 Integral operators [See also 45P05]
47G20 Integro-differential operators [See also 34K30, 35R09, 35R10, 45Jxx, 45Kxx]
47G30 Pseudodifferential operators [See also 35Sxx, 58Jxx]

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47G40 Potential operators [See also 31–XX]
47G99 None of the above, but in this section
47Hxx **Nonlinear operators and their properties {For global and geometric aspects, see 49J53, 58–XX, especially 58Cxx}**
47H04 Set-valued operators [See also 28B20, 54C60, 58C06]
47H05 Monotone operators and generalizations
47H06 Accretive operators, dissipative operators, etc.
47H07 Monotone and positive operators on ordered Banach spaces or other ordered topological vector spaces
47H08 Measures of noncompactness and condensing mappings, K-set contractions, etc.
47H09 Contraction-type mappings, nonexpansive mappings, A-proper mappings, etc.
47H10 Fixed-point theorems [See also 37C25, 54H25, 55M20, 58C30]
47H11 Degree theory [See also 55M25, 58C30]
47H14 Perturbations of nonlinear operators [See also 47A55, 58J37, 70H09, 70K60, 81Q15]
47H20 Semigroups of nonlinear operators [See also 37L05, 47J35, 54H15, 58D07]
47H25 Nonlinear ergodic theorems [See also 28Dxx, 37Axx, 47A35]
47H30 Particular nonlinear operators (superposition, Hammerstein, Nemytskiĭ, Uryson, etc.) [See also 45Gxx, 45P05]
47H40 Random operators [See also 47B80, 60H25]
47H60 Multilinear and polynomial operators [See also 46G25]
47H99 None of the above, but in this section
47Jxx **Equations and inequalities involving nonlinear operators [See also 46Txx] {For global and geometric aspects, see 58–XX}**
47J05 Equations involving nonlinear operators (general) [See also 47H10, 47J25]
47J06 Nonlinear ill-posed problems [See also 35R25, 47A52, 65F22, 65J20, 65L08, 65M30, 65R30]
47J07 Abstract inverse mapping and implicit function theorems [See also 46T20 and 58C15]
47J10 Nonlinear spectral theory, nonlinear eigenvalue problems [See also 49R05]
47J15 Abstract bifurcation theory [See also 34C23, 37Gxx, 58E07, 58E09]
47J20 Variational and other types of inequalities involving nonlinear operators (general) [See also 49J40]
47J22 Variational and other types of inclusions [See also 34A60, 49J21, 49K21]
47J25 Iterative procedures [See also 65J15]
47J30 Variational methods [See also 58Exx]
47J35 Nonlinear evolution equations [See also 34G20, 35K90, 35L90, 35Qxx, 35R20, 37Kxx, 37Lxx, 47H20, 58D25]
47J40 Equations with hysteresis operators [See also 34C55, 74N30]
47J99 None of the above, but in this section
47Lxx **Linear spaces and algebras of operators [See also 46Lxx]**
47L05 Linear spaces of operators [See also 46A32 and 46B28]
47L07 Convex sets and cones of operators [See also 46A55]
47L10 Algebras of operators on Banach spaces and other topological linear spaces
47L15 Operator algebras with symbol structure
47L20 Operator ideals [See also 47B10]
47L22 Ideals of polynomials and of multilinear mappings
47L25 Operator spaces (= matricially normed spaces) [See also 46L07]
47L30 Abstract operator algebras on Hilbert spaces
47L35 Nest algebras, CSL algebras
47L40 Limit algebras, subalgebras of C^*-algebras
47L45 Dual algebras; weakly closed singly generated operator algebras
47L50 Dual spaces of operator algebras
47L55 Representations of (nonselfadjoint) operator algebras
47L60 Algebras of unbounded operators; partial algebras of operators
47L65 Crossed product algebras (analytic crossed products)
47L70 Nonassociative nonselfadjoint operator algebras
47L75 Other nonselfadjoint operator algebras
47L80 Algebras of specific types of operators (Toeplitz, integral, pseudodifferential, etc.)
47L90 Applications of operator algebras to physics
47L99 None of the above, but in this section
47Nxx **Miscellaneous applications of operator theory [See also 46Nxx]**
47N10 Applications in optimization, convex analysis, mathematical programming, economics
47N20 Applications to differential and integral equations
47N30 Applications in probability theory and statistics
47N40 Applications in numerical analysis [See also 65Jxx]
47N50 Applications in the physical sciences
47N60 Applications in chemistry and life sciences
47N70 Applications in systems theory, circuits, and control theory
47N99 None of the above, but in this section
47Sxx **Other (nonclassical) types of operator theory [See also 46Sxx]**
47S10 Operator theory over fields other than **R**, **C** or the quaternions; non-Archimedean operator theory
47S20 Nonstandard operator theory [See also 03H05]
47S30 Constructive operator theory [See also 03F60]
47S40 Fuzzy operator theory [See also 03E72]
47S50 Operator theory in probabilistic metric linear spaces [See also 54E70]
47S99 None of the above, but in this section

49-XX **CALCULUS OF VARIATIONS AND OPTIMAL CONTROL; OPTIMIZATION [See also 34H05, 34K35, 65Kxx, 90Cxx, 93-XX]**
49-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
49-01 Instructional exposition (textbooks, tutorial papers, etc.)
49-02 Research exposition (monographs, survey articles)
49-03 Historical (must also be assigned at least one classification number from Section 01)
49-04 Explicit machine computation and programs (not the theory of computation or programming)
49-06 Proceedings, conferences, collections, etc.
49Jxx **Existence theories**
49J05 Free problems in one independent variable
49J10 Free problems in two or more independent variables
49J15 Optimal control problems involving ordinary differential equations
49J20 Optimal control problems involving partial differential equations
49J21 Optimal control problems involving relations other than differential equations
49J27 Problems in abstract spaces [See also 90C48, 93C25]
49J30 Optimal solutions belonging to restricted classes (Lipschitz controls, bang-bang controls, etc.)
49J35 Minimax problems
49J40 Variational methods including variational inequalities [See also 47J20]
49J45 Methods involving semicontinuity and convergence; relaxation
49J50 Fréchet and Gateaux differentiability [See also 46G05, 58C20]
49J52 Nonsmooth analysis [See also 46G05, 58C50, 90C56]
49J53 Set-valued and variational analysis [See also 28B20, 47H04, 54C60, 58C06]
49J55 Problems involving randomness [See also 93E20]
49J99 None of the above, but in this section
49Kxx **Optimality conditions**
49K05 Free problems in one independent variable
49K10 Free problems in two or more independent variables
49K15 Problems involving ordinary differential equations
49K20 Problems involving partial differential equations
49K21 Problems involving relations other than differential equations
49K27 Problems in abstract spaces [See also 90C48, 93C25]
49K30 Optimal solutions belonging to restricted classes
49K35 Minimax problems
49K40 Sensitivity, stability, well-posedness [See also 90C31]
49K45 Problems involving randomness [See also 93E20]
49K99 None of the above, but in this section
49Lxx **Hamilton-Jacobi theories, including dynamic programming**
49L20 Dynamic programming method
49L25 Viscosity solutions
49L99 None of the above, but in this section
49Mxx **Numerical methods [See also 90Cxx, 65Kxx]**
49M05 Methods based on necessary conditions
49M15 Newton-type methods
49M20 Methods of relaxation type
49M25 Discrete approximations
49M27 Decomposition methods
49M29 Methods involving duality
49M30 Other methods
49M37 Methods of nonlinear programming type [See also 90C30, 65Kxx]
49M99 None of the above, but in this section
49Nxx **Miscellaneous topics**
49N05 Linear optimal control problems [See also 93C05]
49N10 Linear-quadratic problems
49N15 Duality theory
49N20 Periodic optimization
49N25 Impulsive optimal control problems
49N30 Problems with incomplete information [See also 93C41]
49N35 Optimal feedback synthesis [See also 93B52]
49N45 Inverse problems
49N60 Regularity of solutions
49N70 Differential games
49N75 Pursuit and evasion games
49N90 Applications of optimal control and differential games [See also 90C90, 93C95]
49N99 None of the above, but in this section

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49Qxx **Manifolds [See also 58Exx]**
49Q05 Minimal surfaces [See also 53A10, 58E12]
49Q10 Optimization of shapes other than minimal surfaces [See also 90C90]
49Q12 Sensitivity analysis
49Q15 Geometric measure and integration theory, integral and normal currents [See also 28A75, 32C30, 58A25, 58C35]
49Q20 Variational problems in a geometric measure-theoretic setting
49Q99 None of the above, but in this section
49Rxx **Variational methods for eigenvalues of operators [See also 47A75]**
49R05 Variational methods for eigenvalues of operators [See also 47A75] (should also be assigned at least one other classification number in Section 49)
49R99 None of the above, but in this section
49Sxx **Variational principles of physics**
49S05 Variational principles of physics (should also be assigned at least one other classification number in section 49)
49S99 None of the above, but in this section

51-XX **GEOMETRY {For algebraic geometry, see 14-XX}**
51-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
51-01 Instructional exposition (textbooks, tutorial papers, etc.)
51-02 Research exposition (monographs, survey articles)
51-03 Historical (must also be assigned at least one classification number from Section 01)
51-04 Explicit machine computation and programs (not the theory of computation or programming)
51-06 Proceedings, conferences, collections, etc.
51Axx **Linear incidence geometry**
51A05 General theory and projective geometries
51A10 Homomorphism, automorphism and dualities
51A15 Structures with parallelism
51A20 Configuration theorems
51A25 Algebraization [See also 12Kxx, 20N05]
51A30 Desarguesian and Pappian geometries
51A35 Non-Desarguesian affine and projective planes
51A40 Translation planes and spreads
51A45 Incidence structures imbeddable into projective geometries
51A50 Polar geometry, symplectic spaces, orthogonal spaces
51A99 None of the above, but in this section
51Bxx **Nonlinear incidence geometry**
51B05 General theory
51B10 Möbius geometries
51B15 Laguerre geometries
51B20 Minkowski geometries
51B25 Lie geometries
51B99 None of the above, but in this section
51Cxx **Ring geometry (Hjelmslev, Barbilian, etc.)**
51C05 Ring geometry (Hjelmslev, Barbilian, etc.)
51C99 None of the above, but in this section
51Dxx **Geometric closure systems**
51D05 Abstract (Maeda) geometries
51D10 Abstract geometries with exchange axiom
51D15 Abstract geometries with parallelism
51D20 Combinatorial geometries [See also 05B25, 05B35]
51D25 Lattices of subspaces [See also 05B35]
51D30 Continuous geometries and related topics [See also 06Cxx]
51D99 None of the above, but in this section
51Exx **Finite geometry and special incidence structures**
51E05 General block designs [See also 05B05]
51E10 Steiner systems
51E12 Generalized quadrangles, generalized polygons
51E14 Finite partial geometries (general), nets, partial spreads
51E15 Affine and projective planes
51E20 Combinatorial structures in finite projective spaces [See also 05Bxx]
51E21 Blocking sets, ovals, k-arcs
51E22 Linear codes and caps in Galois spaces [See also 94B05]
51E23 Spreads and packing problems
51E24 Buildings and the geometry of diagrams
51E25 Other finite nonlinear geometries
51E26 Other finite linear geometries
51E30 Other finite incidence structures [See also 05B30]
51E99 None of the above, but in this section
51Fxx **Metric geometry**
51F05 Absolute planes
51F10 Absolute spaces
51F15 Reflection groups, reflection geometries [See also 20H10, 20H15; for Coxeter groups, see 20F55]
51F20 Congruence and orthogonality [See also 20H05]
51F25 Orthogonal and unitary groups [See also 20H05]
51F99 None of the above, but in this section
51Gxx **Ordered geometries (ordered incidence structures, etc.)**
51G05 Ordered geometries (ordered incidence structures, etc.)
51G99 None of the above, but in this section
51Hxx **Topological geometry**
51H05 General theory
51H10 Topological linear incidence structures
51H15 Topological nonlinear incidence structures
51H20 Topological geometries on manifolds [See also 57–XX]
51H25 Geometries with differentiable structure [See also 53Cxx, 53C70]
51H30 Geometries with algebraic manifold structure [See also 14–XX]
51H99 None of the above, but in this section
51Jxx **Incidence groups**
51J05 General theory
51J10 Projective incidence groups
51J15 Kinematic spaces
51J20 Representation by near-fields and near-algebras [See also 12K05, 16Y30]
51J99 None of the above, but in this section
51Kxx **Distance geometry**
51K05 General theory
51K10 Synthetic differential geometry
51K99 None of the above, but in this section
51Lxx **Geometric order structures [See also 53C75]**
51L05 Geometry of orders of nondifferentiable curves
51L10 Directly differentiable curves
51L15 n-vertex theorems via direct methods
51L20 Geometry of orders of surfaces
51L99 None of the above, but in this section
51Mxx **Real and complex geometry**
51M04 Elementary problems in Euclidean geometries
51M05 Euclidean geometries (general) and generalizations
51M09 Elementary problems in hyperbolic and elliptic geometries
51M10 Hyperbolic and elliptic geometries (general) and generalizations
51M15 Geometric constructions
51M16 Inequalities and extremum problems {For convex problems, see 52A40}
51M20 Polyhedra and polytopes; regular figures, division of spaces [See also 51F15]
51M25 Length, area and volume [See also 26B15]
51M30 Line geometries and their generalizations [See also 53A25]
51M35 Synthetic treatment of fundamental manifolds in projective geometries (Grassmannians, Veronesians and their generalizations) [See also 14M15]
51M99 None of the above, but in this section
51Nxx **Analytic and descriptive geometry**
51N05 Descriptive geometry [See also 65D17, 68U07]
51N10 Affine analytic geometry
51N15 Projective analytic geometry
51N20 Euclidean analytic geometry
51N25 Analytic geometry with other transformation groups
51N30 Geometry of classical groups [See also 20Gxx, 14L35]
51N35 Questions of classical algebraic geometry [See also 14Nxx]
51N99 None of the above, but in this section
51Pxx **Geometry and physics (should also be assigned at least one other classification number from Sections 70–86)**
51P05 Geometry and physics (should also be assigned at least one other classification number from Sections 70–86)
51P99 None of the above, but in this section

52-XX **CONVEX AND DISCRETE GEOMETRY**
52-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
52-01 Instructional exposition (textbooks, tutorial papers, etc.)
52-02 Research exposition (monographs, survey articles)
52-03 Historical (must also be assigned at least one classification number from Section 01)
52-04 Explicit machine computation and programs (not the theory of computation or programming)
52-06 Proceedings, conferences, collections, etc.
52Axx **General convexity**
52A01 Axiomatic and generalized convexity
52A05 Convex sets without dimension restrictions
52A07 Convex sets in topological vector spaces [See also 46A55]
52A10 Convex sets in 2 dimensions (including convex curves) [See also 53A04]
52A15 Convex sets in 3 dimensions (including convex surfaces) [See also 53A05, 53C45]
52A20 Convex sets in n dimensions (including convex hypersurfaces) [See also 53A07, 53C45]
52A21 Finite-dimensional Banach spaces (including special norms, zonoids, etc.) [See also 46Bxx]

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52A22 Random convex sets and integral geometry [See also 53C65, 60D05]
52A23 Asymptotic theory of convex bodies [See also 46B06]
52A27 Approximation by convex sets
52A30 Variants of convex sets (star-shaped, (m, n)-convex, etc.)
52A35 Helly-type theorems and geometric transversal theory
52A37 Other problems of combinatorial convexity
52A38 Length, area, volume [See also 26B15, 28A75, 49Q20]
52A39 Mixed volumes and related topics
52A40 Inequalities and extremum problems
52A41 Convex functions and convex programs [See also 26B25, 90C25]
52A55 Spherical and hyperbolic convexity
52A99 None of the above, but in this section

52Bxx **Polytopes and polyhedra**
52B05 Combinatorial properties (number of faces, shortest paths, etc.) [See also 05Cxx]
52B10 Three-dimensional polytopes
52B11 n-dimensional polytopes
52B12 Special polytopes (linear programming, centrally symmetric, etc.)
52B15 Symmetry properties of polytopes
52B20 Lattice polytopes (including relations with commutative algebra and algebraic geometry) [See also 06A11, 13F20, 13Hxx]
52B22 Shellability
52B35 Gale and other diagrams
52B40 Matroids (realizations in the context of convex polytopes, convexity in combinatorial structures, etc.) [See also 05B35, 52Cxx]
52B45 Dissections and valuations (Hilbert's third problem, etc.)
52B55 Computational aspects related to convexity {For computational geometry and algorithms, see 68Q25, 68U05; for numerical algorithms, see 65Yxx} [See also 68Uxx]
52B60 Isoperimetric problems for polytopes
52B70 Polyhedral manifolds
52B99 None of the above, but in this section

52Cxx **Discrete geometry**
52C05 Lattices and convex bodies in 2 dimensions [See also 11H06, 11H31, 11P21]
52C07 Lattices and convex bodies in n dimensions [See also 11H06, 11H31, 11P21]
52C10 Erdős problems and related topics of discrete geometry [See also 11Hxx]
52C15 Packing and covering in 2 dimensions [See also 05B40, 11H31]
52C17 Packing and covering in n dimensions [See also 05B40, 11H31]
52C20 Tilings in 2 dimensions [See also 05B45, 51M20]
52C22 Tilings in n dimensions [See also 05B45, 51M20]
52C23 Quasicrystals, aperiodic tilings
52C25 Rigidity and flexibility of structures [See also 70B15]
52C26 Circle packings and discrete conformal geometry
52C30 Planar arrangements of lines and pseudolines
52C35 Arrangements of points, flats, hyperplanes [See also 32S22]
52C40 Oriented matroids
52C45 Combinatorial complexity of geometric structures [See also 68U05]
52C99 None of the above, but in this section

53-XX **DIFFERENTIAL GEOMETRY {For differential topology, see 57Rxx. For foundational questions of differentiable manifolds, see 58Axx}**
53-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
53-01 Instructional exposition (textbooks, tutorial papers, etc.)
53-02 Research exposition (monographs, survey articles)
53-03 Historical (must also be assigned at least one classification number from Section 01)
53-04 Explicit machine computation and programs (not the theory of computation or programming)
53-06 Proceedings, conferences, collections, etc.

53Axx **Classical differential geometry**
53A04 Curves in Euclidean space
53A05 Surfaces in Euclidean space
53A07 Higher-dimensional and -codimensional surfaces in Euclidean n-space
53A10 Minimal surfaces, surfaces with prescribed mean curvature [See also 49Q05, 49Q10, 53C42]
53A15 Affine differential geometry
53A17 Kinematics
53A20 Projective differential geometry
53A25 Differential line geometry
53A30 Conformal differential geometry
53A35 Non-Euclidean differential geometry
53A40 Other special differential geometries
53A45 Vector and tensor analysis
53A55 Differential invariants (local theory), geometric objects
53A60 Geometry of webs [See also 14C21, 20N05]
53A99 None of the above, but in this section

53Bxx **Local differential geometry**
53B05 Linear and affine connections
53B10 Projective connections
53B15 Other connections
53B20 Local Riemannian geometry
53B21 Methods of Riemannian geometry
53B25 Local submanifolds [See also 53C40]
53B30 Lorentz metrics, indefinite metrics
53B35 Hermitian and Kählerian structures [See also 32Cxx]
53B40 Finsler spaces and generalizations (areal metrics)
53B50 Applications to physics
53B99 None of the above, but in this section

53Cxx **Global differential geometry [See also 51H25, 58–XX; for related bundle theory, see 55Rxx, 57Rxx]**
53C05 Connections, general theory
53C07 Special connections and metrics on vector bundles (Hermite-Einstein-Yang-Mills) [See also 32Q20]
53C08 Gerbes, differential characters: differential geometric aspects
53C10 G-structures
53C12 Foliations (differential geometric aspects) [See also 57R30, 57R32]
53C15 General geometric structures on manifolds (almost complex, almost product structures, etc.)
53C17 Sub-Riemannian geometry
53C20 Global Riemannian geometry, including pinching [See also 31C12, 58B20]
53C21 Methods of Riemannian geometry, including PDE methods; curvature restrictions [See also 58J60]
53C22 Geodesics [See also 58E10]
53C23 Global geometric and topological methods (à la Gromov); differential geometric analysis on metric spaces
53C24 Rigidity results
53C25 Special Riemannian manifolds (Einstein, Sasakian, etc.)
53C26 Hyper-Kähler and quaternionic Kähler geometry, "special" geometry
53C27 Spin and Spin^c geometry
53C28 Twistor methods [See also 32L25]
53C29 Issues of holonomy
53C30 Homogeneous manifolds [See also 14M15, 14M17, 32M10, 57T15]
53C35 Symmetric spaces [See also 32M15, 57T15]
53C38 Calibrations and calibrated geometries
53C40 Global submanifolds [See also 53B25]
53C42 Immersions (minimal, prescribed curvature, tight, etc.) [See also 49Q05, 49Q10, 53A10, 57R40, 57R42]
53C43 Differential geometric aspects of harmonic maps [See also 58E20]
53C44 Geometric evolution equations (mean curvature flow, Ricci flow, etc.)
53C45 Global surface theory (convex surfaces à la A. D. Aleksandrov)
53C50 Lorentz manifolds, manifolds with indefinite metrics
53C55 Hermitian and Kählerian manifolds [See also 32Cxx]
53C56 Other complex differential geometry [See also 32Cxx]
53C60 Finsler spaces and generalizations (areal metrics) [See also 58B20]
53C65 Integral geometry [See also 52A22, 60D05]; differential forms, currents, etc. [See mainly 58Axx]
53C70 Direct methods (G-spaces of Busemann, etc.)
53C75 Geometric orders, order geometry [See also 51Lxx]
53C80 Applications to physics
53C99 None of the above, but in this section

53Dxx **Symplectic geometry, contact geometry [See also 37Jxx, 70Gxx, 70Hxx]**
53D05 Symplectic manifolds, general
53D10 Contact manifolds, general
53D12 Lagrangian submanifolds; Maslov index
53D15 Almost contact and almost symplectic manifolds
53D17 Poisson manifolds; Poisson groupoids and algebroids
53D18 Generalized geometries (à la Hitchin)
53D20 Momentum maps; symplectic reduction
53D22 Canonical transformations
53D25 Geodesic flows
53D30 Symplectic structures of moduli spaces
53D35 Global theory of symplectic and contact manifolds [See also 57Rxx]
53D37 Mirror symmetry, symplectic aspects; homological mirror symmetry; Fukaya category [See also 14J33]
53D40 Floer homology and cohomology, symplectic aspects
53D42 Symplectic field theory; contact homology
53D45 Gromov-Witten invariants, quantum cohomology, Frobenius manifolds [See also 14N35]
53D50 Geometric quantization
53D55 Deformation quantization, star products
53D99 None of the above, but in this section

53Zxx **Applications to physics**
53Z05 Applications to physics
53Z99 None of the above, but in this section

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54-XX **GENERAL TOPOLOGY {For the topology of manifolds of all dimensions, see 57Nxx}**
54-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
54-01 Instructional exposition (textbooks, tutorial papers, etc.)
54-02 Research exposition (monographs, survey articles)
54-03 Historical (must also be assigned at least one classification number from Section 01)
54-04 Explicit machine computation and programs (not the theory of computation or programming)
54-06 Proceedings, conferences, collections, etc.
54Axx **Generalities**
54A05 Topological spaces and generalizations (closure spaces, etc.)
54A10 Several topologies on one set (change of topology, comparison of topologies, lattices of topologies)
54A15 Syntopogeneous structures
54A20 Convergence in general topology (sequences, filters, limits, convergence spaces, etc.)
54A25 Cardinality properties (cardinal functions and inequalities, discrete subsets) [See also 03Exx] {For ultrafilters, see 54D80}
54A35 Consistency and independence results [See also 03E35]
54A40 Fuzzy topology [See also 03E72]
54A99 None of the above, but in this section
54Bxx **Basic constructions**
54B05 Subspaces
54B10 Product spaces
54B15 Quotient spaces, decompositions
54B17 Adjunction spaces and similar constructions
54B20 Hyperspaces
54B30 Categorical methods [See also 18B30]
54B35 Spectra
54B40 Presheaves and sheaves [See also 18F20]
54B99 None of the above, but in this section
54Cxx **Maps and general types of spaces defined by maps**
54C05 Continuous maps
54C08 Weak and generalized continuity
54C10 Special maps on topological spaces (open, closed, perfect, etc.)
54C15 Retraction
54C20 Extension of maps
54C25 Embedding
54C30 Real-valued functions [See also 26–XX]
54C35 Function spaces [See also 46Exx, 58D15]
54C40 Algebraic properties of function spaces [See also 46J10]
54C45 C- and C^*-embedding
54C50 Special sets defined by functions [See also 26A21]
54C55 Absolute neighborhood extensor, absolute extensor, absolute neighborhood retract (ANR), absolute retract spaces (general properties) [See also 55M15]
54C56 Shape theory [See also 55P55, 57N25]
54C60 Set-valued maps [See also 26E25, 28B20, 47H04, 58C06]
54C65 Selections [See also 28B20]
54C70 Entropy
54C99 None of the above, but in this section
54Dxx **Fairly general properties**
54D05 Connected and locally connected spaces (general aspects)
54D10 Lower separation axioms (T_0–T_3, etc.)
54D15 Higher separation axioms (completely regular, normal, perfectly or collectionwise normal, etc.)
54D20 Noncompact covering properties (paracompact, Lindelöf, etc.)
54D25 "P-minimal" and "P-closed" spaces
54D30 Compactness
54D35 Extensions of spaces (compactifications, supercompactifications, completions, etc.)
54D40 Remainders
54D45 Local compactness, σ-compactness
54D50 k-spaces
54D55 Sequential spaces
54D60 Realcompactness and realcompactification
54D65 Separability
54D70 Base properties
54D80 Special constructions of spaces (spaces of ultrafilters, etc.)
54D99 None of the above, but in this section
54Exx **Spaces with richer structures**
54E05 Proximity structures and generalizations
54E15 Uniform structures and generalizations
54E17 Nearness spaces
54E18 p-spaces, M-spaces, σ-spaces, etc.
54E20 Stratifiable spaces, cosmic spaces, etc.
54E25 Semimetric spaces
54E30 Moore spaces
54E35 Metric spaces, metrizability
54E40 Special maps on metric spaces
54E45 Compact (locally compact) metric spaces
54E50 Complete metric spaces
54E52 Baire category, Baire spaces
54E55 Bitopologies
54E70 Probabilistic metric spaces
54E99 None of the above, but in this section
54Fxx **Special properties**
54F05 Linearly ordered topological spaces, generalized ordered spaces, and partially ordered spaces [See also 06B30, 06F30]
54F15 Continua and generalizations
54F35 Higher-dimensional local connectedness [See also 55Mxx, 55Nxx]
54F45 Dimension theory [See also 55M10]
54F50 Spaces of dimension ≤ 1; curves, dendrites [See also 26A03]
54F55 Unicoherence, multicoherence
54F65 Topological characterizations of particular spaces
54F99 None of the above, but in this section
54Gxx **Peculiar spaces**
54G05 Extremally disconnected spaces, F-spaces, etc.
54G10 P-spaces
54G12 Scattered spaces
54G15 Pathological spaces
54G20 Counterexamples
54G99 None of the above, but in this section
54Hxx **Connections with other structures, applications**
54H05 Descriptive set theory (topological aspects of Borel, analytic, projective, etc. sets) [See also 03E15, 26A21, 28A05]
54H10 Topological representations of algebraic systems [See also 22–XX]
54H11 Topological groups [See also 22A05]
54H12 Topological lattices, etc. [See also 06B30, 06F30]
54H13 Topological fields, rings, etc. [See also 12Jxx] {For algebraic aspects, see 13Jxx, 16W80}
54H15 Transformation groups and semigroups [See also 20M20, 22–XX, 57Sxx]
54H20 Topological dynamics [See also 28Dxx, 37Bxx]
54H25 Fixed-point and coincidence theorems [See also 47H10, 55M20]
54H99 None of the above, but in this section
54Jxx **Nonstandard topology [See also 03H05]**
54J05 Nonstandard topology [See also 03H05]
54J99 None of the above, but in this section

55-XX **ALGEBRAIC TOPOLOGY**
55-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
55-01 Instructional exposition (textbooks, tutorial papers, etc.)
55-02 Research exposition (monographs, survey articles)
55-03 Historical (must also be assigned at least one classification number from Section 01)
55-04 Explicit machine computation and programs (not the theory of computation or programming)
55-06 Proceedings, conferences, collections, etc.
55Mxx **Classical topics {For the topology of Euclidean spaces and manifolds, see 57Nxx}**
55M05 Duality
55M10 Dimension theory [See also 54F45]
55M15 Absolute neighborhood retracts [See also 54C55]
55M20 Fixed points and coincidences [See also 54H25]
55M25 Degree, winding number
55M30 Ljusternik-Schnirelman (Lyusternik-Shnirel′man) category of a space
55M35 Finite groups of transformations (including Smith theory) [See also 57S17]
55M99 None of the above, but in this section
55Nxx **Homology and cohomology theories [See also 57Txx]**
55N05 Čech types
55N07 Steenrod-Sitnikov homologies
55N10 Singular theory
55N15 K-theory [See also 19Lxx] {For algebraic K-theory, see 18F25, 19–XX}
55N20 Generalized (extraordinary) homology and cohomology theories
55N22 Bordism and cobordism theories, formal group laws [See also 14L05, 19L41, 57R75, 57R77, 57R85, 57R90]
55N25 Homology with local coefficients, equivariant cohomology
55N30 Sheaf cohomology [See also 18F20, 32C35, 32L10]
55N32 Orbifold cohomology
55N33 Intersection homology and cohomology
55N34 Elliptic cohomology
55N35 Other homology theories
55N40 Axioms for homology theory and uniqueness theorems
55N45 Products and intersections
55N91 Equivariant homology and cohomology [See also 19L47]

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55N99 None of the above, but in this section
55Pxx **Homotopy theory {For simple homotopy type, see 57Q10}**
55P05 Homotopy extension properties, cofibrations
55P10 Homotopy equivalences
55P15 Classification of homotopy type
55P20 Eilenberg-Mac Lane spaces
55P25 Spanier-Whitehead duality
55P30 Eckmann-Hilton duality
55P35 Loop spaces
55P40 Suspensions
55P42 Stable homotopy theory, spectra
55P43 Spectra with additional structure (E_∞, A_∞, ring spectra, etc.)
55P45 H-spaces and duals
55P47 Infinite loop spaces
55P48 Loop space machines, operads [See also 18D50]
55P50 String topology
55P55 Shape theory [See also 54C56, 55Q07]
55P57 Proper homotopy theory
55P60 Localization and completion
55P62 Rational homotopy theory
55P65 Homotopy functors
55P91 Equivariant homotopy theory [See also 19L47]
55P92 Relations between equivariant and nonequivariant homotopy theory
55P99 None of the above, but in this section

55Qxx **Homotopy groups**
55Q05 Homotopy groups, general; sets of homotopy classes
55Q07 Shape groups
55Q10 Stable homotopy groups
55Q15 Whitehead products and generalizations
55Q20 Homotopy groups of wedges, joins, and simple spaces
55Q25 Hopf invariants
55Q35 Operations in homotopy groups
55Q40 Homotopy groups of spheres
55Q45 Stable homotopy of spheres
55Q50 J-morphism [See also 19L20]
55Q51 v_n-periodicity
55Q52 Homotopy groups of special spaces
55Q55 Cohomotopy groups
55Q70 Homotopy groups of special types [See also 55N05, 55N07]
55Q91 Equivariant homotopy groups [See also 19L47]
55Q99 None of the above, but in this section
55Rxx **Fiber spaces and bundles [See also 18F15, 32Lxx, 46M20, 57R20, 57R22, 57R25]**
55R05 Fiber spaces
55R10 Fiber bundles
55R12 Transfer
55R15 Classification
55R20 Spectral sequences and homology of fiber spaces [See also 55Txx]
55R25 Sphere bundles and vector bundles
55R35 Classifying spaces of groups and H-spaces
55R37 Maps between classifying spaces
55R40 Homology of classifying spaces, characteristic classes [See also 57Txx, 57R20]
55R45 Homology and homotopy of BO and BU; Bott periodicity
55R50 Stable classes of vector space bundles, K-theory [See also 19Lxx] {For algebraic K-theory, see 18F25, 19–XX}
55R55 Fiberings with singularities
55R60 Microbundles and block bundles [See also 57N55, 57Q50]
55R65 Generalizations of fiber spaces and bundles
55R70 Fibrewise topology
55R80 Discriminantal varieties, configuration spaces
55R91 Equivariant fiber spaces and bundles [See also 19L47]
55R99 None of the above, but in this section
55Sxx **Operations and obstructions**
55S05 Primary cohomology operations
55S10 Steenrod algebra
55S12 Dyer-Lashof operations
55S15 Symmetric products, cyclic products
55S20 Secondary and higher cohomology operations
55S25 K-theory operations and generalized cohomology operations [See also 19D55, 19Lxx]
55S30 Massey products
55S35 Obstruction theory
55S36 Extension and compression of mappings
55S37 Classification of mappings
55S40 Sectioning fiber spaces and bundles
55S45 Postnikov systems, k-invariants
55S91 Equivariant operations and obstructions [See also 19L47]
55S99 None of the above, but in this section

55Txx **Spectral sequences [See also 18G40, 55R20]**
55T05 General
55T10 Serre spectral sequences
55T15 Adams spectral sequences
55T20 Eilenberg-Moore spectral sequences [See also 57T35]
55T25 Generalized cohomology
55T99 None of the above, but in this section
55Uxx **Applied homological algebra and category theory [See also 18Gxx]**
55U05 Abstract complexes
55U10 Simplicial sets and complexes
55U15 Chain complexes
55U20 Universal coefficient theorems, Bockstein operator
55U25 Homology of a product, Künneth formula
55U30 Duality
55U35 Abstract and axiomatic homotopy theory
55U40 Topological categories, foundations of homotopy theory
55U99 None of the above, but in this section

57-XX **MANIFOLDS AND CELL COMPLEXES {For complex manifolds, see 32Qxx}**
57-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
57-01 Instructional exposition (textbooks, tutorial papers, etc.)
57-02 Research exposition (monographs, survey articles)
57-03 Historical (must also be assigned at least one classification number from Section 01)
57-04 Explicit machine computation and programs (not the theory of computation or programming)
57-06 Proceedings, conferences, collections, etc.
57Mxx **Low-dimensional topology**
57M05 Fundamental group, presentations, free differential calculus
57M07 Topological methods in group theory
57M10 Covering spaces
57M12 Special coverings, e.g. branched
57M15 Relations with graph theory [See also 05Cxx]
57M20 Two-dimensional complexes
57M25 Knots and links in S^3 {For higher dimensions, see 57Q45}
57M27 Invariants of knots and 3-manifolds
57M30 Wild knots and surfaces, etc., wild embeddings
57M35 Dehn's lemma, sphere theorem, loop theorem, asphericity
57M40 Characterizations of E^3 and S^3 (Poincaré conjecture) [See also 57N12]
57M50 Geometric structures on low-dimensional manifolds
57M60 Group actions in low dimensions
57M99 None of the above, but in this section
57Nxx **Topological manifolds**
57N05 Topology of E^2, 2-manifolds
57N10 Topology of general 3-manifolds [See also 57Mxx]
57N12 Topology of E^3 and S^3 [See also 57M40]
57N13 Topology of E^4, 4-manifolds [See also 14Jxx, 32Jxx]
57N15 Topology of E^n, n-manifolds ($4 < n < \infty$)
57N16 Geometric structures on manifolds [See also 57M50]
57N17 Topology of topological vector spaces
57N20 Topology of infinite-dimensional manifolds [See also 58Bxx]
57N25 Shapes [See also 54C56, 55P55, 55Q07]
57N30 Engulfing
57N35 Embeddings and immersions
57N37 Isotopy and pseudo-isotopy
57N40 Neighborhoods of submanifolds
57N45 Flatness and tameness
57N50 $S^{n-1} \subset E^n$, Schoenflies problem
57N55 Microbundles and block bundles [See also 55R60, 57Q50]
57N60 Cellularity
57N65 Algebraic topology of manifolds
57N70 Cobordism and concordance
57N75 General position and transversality
57N80 Stratifications
57N99 None of the above, but in this section
57Pxx **Generalized manifolds [See also 18F15]**
57P05 Local properties of generalized manifolds
57P10 Poincaré duality spaces
57P99 None of the above, but in this section
57Qxx **PL-topology**
57Q05 General topology of complexes
57Q10 Simple homotopy type, Whitehead torsion, Reidemeister-Franz torsion, etc. [See also 19B28]
57Q12 Wall finiteness obstruction for CW-complexes
57Q15 Triangulating manifolds
57Q20 Cobordism
57Q25 Comparison of PL-structures: classification, Hauptvermutung
57Q30 Engulfing

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57Q35 Embeddings and immersions
57Q37 Isotopy
57Q40 Regular neighborhoods
57Q45 Knots and links (in high dimensions) {For the low-dimensional case, see 57M25}
57Q50 Microbundles and block bundles [See also 55R60, 57N55]
57Q55 Approximations
57Q60 Cobordism and concordance
57Q65 General position and transversality
57Q91 Equivariant PL-topology
57Q99 None of the above, but in this section
57Rxx **Differential topology {For foundational questions of differentiable manifolds, see 58Axx; for infinite-dimensional manifolds, see 58Bxx}**
57R05 Triangulating
57R10 Smoothing
57R12 Smooth approximations
57R15 Specialized structures on manifolds (spin manifolds, framed manifolds, etc.)
57R17 Symplectic and contact topology
57R18 Topology and geometry of orbifolds
57R19 Algebraic topology on manifolds
57R20 Characteristic classes and numbers
57R22 Topology of vector bundles and fiber bundles [See also 55Rxx]
57R25 Vector fields, frame fields
57R27 Controllability of vector fields on C^∞ and real-analytic manifolds [See also 49Qxx, 37C10, 93B05]
57R30 Foliations; geometric theory
57R32 Classifying spaces for foliations; Gelfand-Fuks cohomology [See also 58H10]
57R35 Differentiable mappings
57R40 Embeddings
57R42 Immersions
57R45 Singularities of differentiable mappings
57R50 Diffeomorphisms
57R52 Isotopy
57R55 Differentiable structures
57R56 Topological quantum field theories
57R57 Applications of global analysis to structures on manifolds, Donaldson and Seiberg-Witten invariants [See also 58–XX]
57R58 Floer homology
57R60 Homotopy spheres, Poincaré conjecture
57R65 Surgery and handlebodies
57R67 Surgery obstructions, Wall groups [See also 19J25]
57R70 Critical points and critical submanifolds
57R75 O- and SO-cobordism
57R77 Complex cobordism (U- and SU-cobordism) [See also 55N22]
57R80 h- and s-cobordism
57R85 Equivariant cobordism
57R90 Other types of cobordism [See also 55N22]
57R91 Equivariant algebraic topology of manifolds
57R95 Realizing cycles by submanifolds
57R99 None of the above, but in this section
57Sxx **Topological transformation groups [See also 20F34, 22–XX, 37–XX, 54H15, 58D05]**
57S05 Topological properties of groups of homeomorphisms or diffeomorphisms
57S10 Compact groups of homeomorphisms
57S15 Compact Lie groups of differentiable transformations
57S17 Finite transformation groups
57S20 Noncompact Lie groups of transformations
57S25 Groups acting on specific manifolds
57S30 Discontinuous groups of transformations
57S99 None of the above, but in this section
57Txx **Homology and homotopy of topological groups and related structures**
57T05 Hopf algebras [See also 16T05]
57T10 Homology and cohomology of Lie groups
57T15 Homology and cohomology of homogeneous spaces of Lie groups
57T20 Homotopy groups of topological groups and homogeneous spaces
57T25 Homology and cohomology of H-spaces
57T30 Bar and cobar constructions [See also 18G55, 55Uxx]
57T35 Applications of Eilenberg-Moore spectral sequences [See also 55R20, 55T20]
57T99 None of the above, but in this section

58-XX **GLOBAL ANALYSIS, ANALYSIS ON MANIFOLDS [See also 32Cxx, 32Fxx, 32Wxx, 46-XX, 47Hxx, 53Cxx]{For geometric integration theory, see 49Q15}**
58-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
58-01 Instructional exposition (textbooks, tutorial papers, etc.)
58-02 Research exposition (monographs, survey articles)
58-03 Historical (must also be assigned at least one classification number from Section 01)
58-04 Explicit machine computation and programs (not the theory of computation or programming)
58-06 Proceedings, conferences, collections, etc.
58Axx **General theory of differentiable manifolds [See also 32Cxx]**
58A03 Topos-theoretic approach to differentiable manifolds
58A05 Differentiable manifolds, foundations
58A07 Real-analytic and Nash manifolds [See also 14P20, 32C07]
58A10 Differential forms
58A12 de Rham theory [See also 14Fxx]
58A14 Hodge theory [See also 14C30, 14Fxx, 32J25, 32S35]
58A15 Exterior differential systems (Cartan theory)
58A17 Pfaffian systems
58A20 Jets
58A25 Currents [See also 32C30, 53C65]
58A30 Vector distributions (subbundles of the tangent bundles)
58A32 Natural bundles
58A35 Stratified sets [See also 32S60]
58A40 Differential spaces
58A50 Supermanifolds and graded manifolds [See also 14A22, 32C11]
58A99 None of the above, but in this section
58Bxx **Infinite-dimensional manifolds**
58B05 Homotopy and topological questions
58B10 Differentiability questions
58B12 Questions of holomorphy [See also 32–XX, 46G20]
58B15 Fredholm structures [See also 47A53]
58B20 Riemannian, Finsler and other geometric structures [See also 53C20, 53C60]
58B25 Group structures and generalizations on infinite-dimensional manifolds [See also 22E65, 58D05]
58B32 Geometry of quantum groups
58B34 Noncommutative geometry (à la Connes)
58B99 None of the above, but in this section
58Cxx **Calculus on manifolds; nonlinear operators [See also 46Txx, 47Hxx, 47Jxx]**
58C05 Real-valued functions
58C06 Set valued and function-space valued mappings [See also 47H04, 54C60]
58C07 Continuity properties of mappings
58C10 Holomorphic maps [See also 32–XX]
58C15 Implicit function theorems; global Newton methods
58C20 Differentiation theory (Gateaux, Fréchet, etc.) [See also 26Exx, 46G05]
58C25 Differentiable maps
58C30 Fixed point theorems on manifolds [See also 47H10]
58C35 Integration on manifolds; measures on manifolds [See also 28Cxx]
58C40 Spectral theory; eigenvalue problems [See also 47J10, 58E07]
58C50 Analysis on supermanifolds or graded manifolds
58C99 None of the above, but in this section
58Dxx **Spaces and manifolds of mappings (including nonlinear versions of 46Exx) [See also 46Txx, 53Cxx]**
58D05 Groups of diffeomorphisms and homeomorphisms as manifolds [See also 22E65, 57S05]
58D07 Groups and semigroups of nonlinear operators [See also 17B65, 47H20]
58D10 Spaces of imbeddings and immersions
58D15 Manifolds of mappings [See also 46T10, 54C35]
58D17 Manifolds of metrics (esp. Riemannian)
58D19 Group actions and symmetry properties
58D20 Measures (Gaussian, cylindrical, etc.) on manifolds of maps [See also 28Cxx, 46T12]
58D25 Equations in function spaces; evolution equations [See also 34Gxx, 35K90, 35L90, 35R15, 37Lxx, 47Jxx]
58D27 Moduli problems for differential geometric structures
58D29 Moduli problems for topological structures
58D30 Applications (in quantum mechanics (Feynman path integrals), relativity, fluid dynamics, etc.)
58D99 None of the above, but in this section
58Exx **Variational problems in infinite-dimensional spaces**
58E05 Abstract critical point theory (Morse theory, Ljusternik-Schnirelman (Lyusternik-Shnirel′man) theory, etc.)
58E07 Abstract bifurcation theory
58E09 Group-invariant bifurcation theory
58E10 Applications to the theory of geodesics (problems in one independent variable)
58E11 Critical metrics
58E12 Applications to minimal surfaces (problems in two independent variables) [See also 49Q05]

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58E15 Application to extremal problems in several variables; Yang-Mills functionals [See also 81T13], etc.
58E17 Pareto optimality, etc., applications to economics [See also 90C29]
58E20 Harmonic maps [See also 53C43], etc.
58E25 Applications to control theory [See also 49–XX, 93–XX]
58E30 Variational principles
58E35 Variational inequalities (global problems)
58E40 Group actions
58E50 Applications
58E99 None of the above, but in this section
58Hxx **Pseudogroups, differentiable groupoids and general structures on manifolds**
58H05 Pseudogroups and differentiable groupoids [See also 22A22, 22E65]
58H10 Cohomology of classifying spaces for pseudogroup structures (Spencer, Gelfand-Fuks, etc.) [See also 57R32]
58H15 Deformations of structures [See also 32Gxx, 58J10]
58H99 None of the above, but in this section
58Jxx **Partial differential equations on manifolds; differential operators [See also 32Wxx, 35–XX, 53Cxx]**
58J05 Elliptic equations on manifolds, general theory [See also 35–XX]
58J10 Differential complexes [See also 35Nxx]; elliptic complexes
58J15 Relations with hyperfunctions
58J20 Index theory and related fixed point theorems [See also 19K56, 46L80]
58J22 Exotic index theories [See also 19K56, 46L05, 46L10, 46L80, 46M20]
58J26 Elliptic genera
58J28 Eta-invariants, Chern-Simons invariants
58J30 Spectral flows
58J32 Boundary value problems on manifolds
58J35 Heat and other parabolic equation methods
58J37 Perturbations; asymptotics
58J40 Pseudodifferential and Fourier integral operators on manifolds [See also 35Sxx]
58J42 Noncommutative global analysis, noncommutative residues
58J45 Hyperbolic equations [See also 35Lxx]
58J47 Propagation of singularities; initial value problems
58J50 Spectral problems; spectral geometry; scattering theory [See also 35Pxx]
58J51 Relations between spectral theory and ergodic theory, e.g. quantum unique ergodicity
58J52 Determinants and determinant bundles, analytic torsion
58J53 Isospectrality
58J55 Bifurcation [See also 35B32]
58J60 Relations with special manifold structures (Riemannian, Finsler, etc.)
58J65 Diffusion processes and stochastic analysis on manifolds [See also 35R60, 60H10, 60J60]
58J70 Invariance and symmetry properties [See also 35A30]
58J72 Correspondences and other transformation methods (e.g. Lie-Bäcklund) [See also 35A22]
58J90 Applications
58J99 None of the above, but in this section
58Kxx **Theory of singularities and catastrophe theory [See also 32Sxx, 37–XX]**
58K05 Critical points of functions and mappings
58K10 Monodromy
58K15 Topological properties of mappings
58K20 Algebraic and analytic properties of mappings
58K25 Stability
58K30 Global theory
58K35 Catastrophe theory
58K40 Classification; finite determinacy of map germs
58K45 Singularities of vector fields, topological aspects
58K50 Normal forms
58K55 Asymptotic behavior
58K60 Deformation of singularities
58K65 Topological invariants
58K70 Symmetries, equivariance
58K99 None of the above, but in this section
58Zxx **Applications to physics**
58Z05 Applications to physics
58Z99 None of the above, but in this section

60-XX **PROBABILITY THEORY AND STOCHASTIC PROCESSES {For additional applications, see 11Kxx, 62-XX, 90-XX, 91-XX, 92-XX, 93-XX, 94-XX}**
60-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
60-01 Instructional exposition (textbooks, tutorial papers, etc.)
60-02 Research exposition (monographs, survey articles)
60-03 Historical (must also be assigned at least one classification number from Section 01)
60-04 Explicit machine computation and programs (not the theory of computation or programming)
60-06 Proceedings, conferences, collections, etc.
60-08 Computational methods (not classified at a more specific level) [See also 65C50]
60Axx **Foundations of probability theory**
60A05 Axioms; other general questions
60A10 Probabilistic measure theory {For ergodic theory, see 28Dxx and 60Fxx}
60A86 Fuzzy probability
60A99 None of the above, but in this section
60Bxx **Probability theory on algebraic and topological structures**
60B05 Probability measures on topological spaces
60B10 Convergence of probability measures
60B11 Probability theory on linear topological spaces [See also 28C20]
60B12 Limit theorems for vector-valued random variables (infinite-dimensional case)
60B15 Probability measures on groups or semigroups, Fourier transforms, factorization
60B20 Random matrices (probabilistic aspects; for algebraic aspects see 15B52)
60B99 None of the above, but in this section
60Cxx **Combinatorial probability**
60C05 Combinatorial probability
60C99 None of the above, but in this section
60Dxx **Geometric probability and stochastic geometry [See also 52A22, 53C65]**
60D05 Geometric probability and stochastic geometry [See also 52A22, 53C65]
60D99 None of the above, but in this section
60Exx **Distribution theory [See also 62Exx, 62Hxx]**
60E05 Distributions: general theory
60E07 Infinitely divisible distributions; stable distributions
60E10 Characteristic functions; other transforms
60E15 Inequalities; stochastic orderings
60E99 None of the above, but in this section
60Fxx **Limit theorems [See also 28Dxx, 60B12]**
60F05 Central limit and other weak theorems
60F10 Large deviations
60F15 Strong theorems
60F17 Functional limit theorems; invariance principles
60F20 Zero-one laws
60F25 L^p-limit theorems
60F99 None of the above, but in this section
60Gxx **Stochastic processes**
60G05 Foundations of stochastic processes
60G07 General theory of processes
60G09 Exchangeability
60G10 Stationary processes
60G12 General second-order processes
60G15 Gaussian processes
60G17 Sample path properties
60G18 Self-similar processes
60G20 Generalized stochastic processes
60G22 Fractional processes, including fractional Brownian motion
60G25 Prediction theory [See also 62M20]
60G30 Continuity and singularity of induced measures
60G35 Signal detection and filtering [See also 62M20, 93E10, 93E11, 94Axx]
60G40 Stopping times; optimal stopping problems; gambling theory [See also 62L15, 91A60]
60G42 Martingales with discrete parameter
60G44 Martingales with continuous parameter
60G46 Martingales and classical analysis
60G48 Generalizations of martingales
60G50 Sums of independent random variables; random walks
60G51 Processes with independent increments; Lévy processes
60G52 Stable processes
60G55 Point processes
60G57 Random measures
60G60 Random fields
60G70 Extreme value theory; extremal processes
60G99 None of the above, but in this section
60Hxx **Stochastic analysis [See also 58J65]**
60H05 Stochastic integrals
60H07 Stochastic calculus of variations and the Malliavin calculus
60H10 Stochastic ordinary differential equations [See also 34F05]
60H15 Stochastic partial differential equations [See also 35R60]
60H20 Stochastic integral equations
60H25 Random operators and equations [See also 47B80]
60H30 Applications of stochastic analysis (to PDE, etc.)

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60H35 Computational methods for stochastic equations [See also 65C30]
60H40 White noise theory
60H99 None of the above, but in this section
60Jxx **Markov processes**
60J05 Discrete-time Markov processes on general state spaces
60J10 Markov chains (discrete-time Markov processes on discrete state spaces)
60J20 Applications of Markov chains and discrete-time Markov processes on general state spaces (social mobility, learning theory, industrial processes, etc.) [See also 90B30, 91D10, 91D35, 91E40]
60J22 Computational methods in Markov chains [See also 65C40]
60J25 Continuous-time Markov processes on general state spaces
60J27 Continuous-time Markov processes on discrete state spaces
60J28 Applications of continuous-time Markov processes on discrete state spaces
60J35 Transition functions, generators and resolvents [See also 47D03, 47D07]
60J40 Right processes
60J45 Probabilistic potential theory [See also 31Cxx, 31D05]
60J50 Boundary theory
60J55 Local time and additive functionals
60J57 Multiplicative functionals
60J60 Diffusion processes [See also 58J65]
60J65 Brownian motion [See also 58J65]
60J67 Stochastic (Schramm-)Loewner evolution (SLE)
60J68 Superprocesses
60J70 Applications of Brownian motions and diffusion theory (population genetics, absorption problems, etc.) [See also 92Dxx]
60J75 Jump processes
60J80 Branching processes (Galton-Watson, birth-and-death, etc.)
60J85 Applications of branching processes [See also 92Dxx]
60J99 None of the above, but in this section
60Kxx **Special processes**
60K05 Renewal theory
60K10 Applications (reliability, demand theory, etc.)
60K15 Markov renewal processes, semi-Markov processes
60K20 Applications of Markov renewal processes (reliability, queueing networks, etc.) [See also 90Bxx]
60K25 Queueing theory [See also 68M20, 90B22]
60K30 Applications (congestion, allocation, storage, traffic, etc.) [See also 90Bxx]
60K35 Interacting random processes; statistical mechanics type models; percolation theory [See also 82B43, 82C43]
60K37 Processes in random environments
60K40 Other physical applications of random processes
60K99 None of the above, but in this section

62-XX **STATISTICS**
62-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
62-01 Instructional exposition (textbooks, tutorial papers, etc.)
62-02 Research exposition (monographs, survey articles)
62-03 Historical (must also be assigned at least one classification number from Section 01)
62-04 Explicit machine computation and programs (not the theory of computation or programming)
62-06 Proceedings, conferences, collections, etc.
62-07 Data analysis
62-09 Graphical methods
62Axx **Foundational and philosophical topics**
62A01 Foundations and philosophical topics
62A86 Fuzzy analysis in statistics
62A99 None of the above, but in this section
62Bxx **Sufficiency and information**
62B05 Sufficient statistics and fields
62B10 Information-theoretic topics [See also 94A17]
62B15 Theory of statistical experiments
62B86 Fuzziness, sufficiency, and information
62B99 None of the above, but in this section
62Cxx **Decision theory [See also 90B50, 91B06; for game theory, see 91A35]**
62C05 General considerations
62C07 Complete class results
62C10 Bayesian problems; characterization of Bayes procedures
62C12 Empirical decision procedures; empirical Bayes procedures
62C15 Admissibility
62C20 Minimax procedures
62C25 Compound decision problems
62C86 Decision theory and fuzziness
62C99 None of the above, but in this section
62Dxx **Sampling theory, sample surveys**
62D05 Sampling theory, sample surveys
62D99 None of the above, but in this section
62Exx **Distribution theory [See also 60Exx]**
62E10 Characterization and structure theory
62E15 Exact distribution theory
62E17 Approximations to distributions (nonasymptotic)
62E20 Asymptotic distribution theory
62E86 Fuzziness in connection with the topics on distributions in this section
62E99 None of the above, but in this section
62Fxx **Parametric inference**
62F03 Hypothesis testing
62F05 Asymptotic properties of tests
62F07 Ranking and selection
62F10 Point estimation
62F12 Asymptotic properties of estimators
62F15 Bayesian inference
62F25 Tolerance and confidence regions
62F30 Inference under constraints
62F35 Robustness and adaptive procedures
62F40 Bootstrap, jackknife and other resampling methods
62F86 Parametric inference and fuzziness
62F99 None of the above, but in this section
62Gxx **Nonparametric inference**
62G05 Estimation
62G07 Density estimation
62G08 Nonparametric regression
62G09 Resampling methods
62G10 Hypothesis testing
62G15 Tolerance and confidence regions
62G20 Asymptotic properties
62G30 Order statistics; empirical distribution functions
62G32 Statistics of extreme values; tail inference
62G35 Robustness
62G86 Nonparametric inference and fuzziness
62G99 None of the above, but in this section
62Hxx **Multivariate analysis [See also 60Exx]**
62H05 Characterization and structure theory
62H10 Distribution of statistics
62H11 Directional data; spatial statistics
62H12 Estimation
62H15 Hypothesis testing
62H17 Contingency tables
62H20 Measures of association (correlation, canonical correlation, etc.)
62H25 Factor analysis and principal components; correspondence analysis
62H30 Classification and discrimination; cluster analysis [See also 68T10, 91C20]
62H35 Image analysis
62H86 Multivariate analysis and fuzziness
62H99 None of the above, but in this section
62Jxx **Linear inference, regression**
62J02 General nonlinear regression
62J05 Linear regression
62J07 Ridge regression; shrinkage estimators
62J10 Analysis of variance and covariance
62J12 Generalized linear models
62J15 Paired and multiple comparisons
62J20 Diagnostics
62J86 Fuzziness, and linear inference and regression
62J99 None of the above, but in this section
62Kxx **Design of experiments [See also 05Bxx]**
62K05 Optimal designs
62K10 Block designs
62K15 Factorial designs
62K20 Response surface designs
62K25 Robust parameter designs
62K86 Fuzziness and design of experiments
62K99 None of the above, but in this section
62Lxx **Sequential methods**
62L05 Sequential design
62L10 Sequential analysis
62L12 Sequential estimation
62L15 Optimal stopping [See also 60G40, 91A60]
62L20 Stochastic approximation
62L86 Fuzziness and sequential methods
62L99 None of the above, but in this section

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62Mxx **Inference from stochastic processes**
62M02 Markov processes: hypothesis testing
62M05 Markov processes: estimation
62M07 Non-Markovian processes: hypothesis testing
62M09 Non-Markovian processes: estimation
62M10 Time series, auto-correlation, regression, etc. [See also 91B84]
62M15 Spectral analysis
62M20 Prediction [See also 60G25]; filtering [See also 60G35, 93E10, 93E11]
62M30 Spatial processes
62M40 Random fields; image analysis
62M45 Neural nets and related approaches
62M86 Inference from stochastic processes and fuzziness
62M99 None of the above, but in this section
62Nxx **Survival analysis and censored data**
62N01 Censored data models
62N02 Estimation
62N03 Testing
62N05 Reliability and life testing [See also 90B25]
62N86 Fuzziness, and survival analysis and censored data
62N99 None of the above, but in this section
62Pxx **Applications [See also 90–XX, 91–XX, 92–XX]**
62P05 Applications to actuarial sciences and financial mathematics
62P10 Applications to biology and medical sciences
62P12 Applications to environmental and related topics
62P15 Applications to psychology
62P20 Applications to economics [See also 91Bxx]
62P25 Applications to social sciences
62P30 Applications in engineering and industry
62P35 Applications to physics
62P99 None of the above, but in this section
62Qxx **Statistical tables**
62Q05 Statistical tables
62Q99 None of the above, but in this section

65-XX **NUMERICAL ANALYSIS**
65-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
65-01 Instructional exposition (textbooks, tutorial papers, etc.)
65-02 Research exposition (monographs, survey articles)
65-03 Historical (must also be assigned at least one classification number from Section 01)
65-04 Explicit machine computation and programs (not the theory of computation or programming)
65-05 Experimental papers
65-06 Proceedings, conferences, collections, etc.
65Axx **Tables**
65A05 Tables
65A99 None of the above, but in this section
65Bxx **Acceleration of convergence**
65B05 Extrapolation to the limit, deferred corrections
65B10 Summation of series
65B15 Euler-Maclaurin formula
65B99 None of the above, but in this section
65Cxx **Probabilistic methods, simulation and stochastic differential equations {For theoretical aspects, see 68U20 and 60H35}**
65C05 Monte Carlo methods
65C10 Random number generation
65C20 Models, numerical methods [See also 68U20]
65C30 Stochastic differential and integral equations
65C35 Stochastic particle methods [See also 82C80]
65C40 Computational Markov chains
65C50 Other computational problems in probability
65C60 Computational problems in statistics
65C99 None of the above, but in this section
65Dxx **Numerical approximation and computational geometry (primarily algorithms) {For theory, see 41–XX and 68Uxx}**
65D05 Interpolation
65D07 Splines
65D10 Smoothing, curve fitting
65D15 Algorithms for functional approximation
65D17 Computer aided design (modeling of curves and surfaces) [See also 68U07]
65D18 Computer graphics, image analysis, and computational geometry [See also 51N05, 68U05]
65D19 Computational issues in computer and robotic vision
65D20 Computation of special functions, construction of tables [See also 33F05]
65D25 Numerical differentiation
65D30 Numerical integration
65D32 Quadrature and cubature formulas
65D99 None of the above, but in this section
65Exx **Numerical methods in complex analysis (potential theory, etc.) {For numerical methods in conformal mapping, see also 30C30}**
65E05 Numerical methods in complex analysis (potential theory, etc.) {For numerical methods in conformal mapping, see also 30C30}
65E99 None of the above, but in this section
65Fxx **Numerical linear algebra**
65F05 Direct methods for linear systems and matrix inversion
65F08 Preconditioners for iterative methods
65F10 Iterative methods for linear systems [See also 65N22]
65F15 Eigenvalues, eigenvectors
65F18 Inverse eigenvalue problems
65F20 Overdetermined systems, pseudoinverses
65F22 Ill-posedness, regularization
65F25 Orthogonalization
65F30 Other matrix algorithms
65F35 Matrix norms, conditioning, scaling [See also 15A12, 15A60]
65F40 Determinants
65F50 Sparse matrices
65F60 Matrix exponential and similar matrix functions
65F99 None of the above, but in this section
65Gxx **Error analysis and interval analysis**
65G20 Algorithms with automatic result verification
65G30 Interval and finite arithmetic
65G40 General methods in interval analysis
65G50 Roundoff error
65G99 None of the above, but in this section
65Hxx **Nonlinear algebraic or transcendental equations**
65H04 Roots of polynomial equations
65H05 Single equations
65H10 Systems of equations
65H17 Eigenvalues, eigenvectors [See also 47Hxx, 47Jxx, 58C40, 58E07, 90C30]
65H20 Global methods, including homotopy approaches [See also 58C30, 90C30]
65H99 None of the above, but in this section
65Jxx **Numerical analysis in abstract spaces**
65J05 General theory
65J08 Abstract evolution equations
65J10 Equations with linear operators (do not use 65Fxx)
65J15 Equations with nonlinear operators (do not use 65Hxx)
65J20 Improperly posed problems; regularization
65J22 Inverse problems
65J99 None of the above, but in this section
65Kxx **Mathematical programming, optimization and variational techniques**
65K05 Mathematical programming methods [See also 90Cxx]
65K10 Optimization and variational techniques [See also 49Mxx, 93B40]
65K15 Numerical methods for variational inequalities and related problems
65K99 None of the above, but in this section
65Lxx **Ordinary differential equations**
65L03 Functional-differential equations
65L04 Stiff equations
65L05 Initial value problems
65L06 Multistep, Runge-Kutta and extrapolation methods
65L07 Numerical investigation of stability of solutions
65L08 Improperly posed problems
65L09 Inverse problems
65L10 Boundary value problems
65L11 Singularly perturbed problems
65L12 Finite difference methods
65L15 Eigenvalue problems
65L20 Stability and convergence of numerical methods
65L50 Mesh generation and refinement
65L60 Finite elements, Rayleigh-Ritz, Galerkin and collocation methods
65L70 Error bounds
65L80 Methods for differential-algebraic equations
65L99 None of the above, but in this section
65Mxx **Partial differential equations, initial value and time-dependent initial-boundary value problems**
65M06 Finite difference methods
65M08 Finite volume methods
65M12 Stability and convergence of numerical methods
65M15 Error bounds
65M20 Method of lines
65M22 Solution of discretized equations [See also 65Fxx, 65Hxx]
65M25 Method of characteristics
65M30 Improperly posed problems
65M32 Inverse problems
65M38 Boundary element methods
65M50 Mesh generation and refinement
65M55 Multigrid methods; domain decomposition

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65M60 Finite elements, Rayleigh-Ritz and Galerkin methods, finite methods
65M70 Spectral, collocation and related methods
65M75 Probabilistic methods, particle methods, etc.
65M80 Fundamental solutions, Green's function methods, etc.
65M85 Fictitious domain methods
65M99 None of the above, but in this section
65Nxx **Partial differential equations, boundary value problems**
65N06 Finite difference methods
65N08 Finite volume methods
65N12 Stability and convergence of numerical methods
65N15 Error bounds
65N20 Ill-posed problems
65N21 Inverse problems
65N22 Solution of discretized equations [See also 65Fxx, 65Hxx]
65N25 Eigenvalue problems
65N30 Finite elements, Rayleigh-Ritz and Galerkin methods, finite methods
65N35 Spectral, collocation and related methods
65N38 Boundary element methods
65N40 Method of lines
65N45 Method of contraction of the boundary
65N50 Mesh generation and refinement
65N55 Multigrid methods; domain decomposition
65N75 Probabilistic methods, particle methods, etc.
65N80 Fundamental solutions, Green's function methods, etc.
65N85 Fictitious domain methods
65N99 None of the above, but in this section
65Pxx **Numerical problems in dynamical systems [See also 37Mxx]**
65P10 Hamiltonian systems including symplectic integrators
65P20 Numerical chaos
65P30 Bifurcation problems
65P40 Nonlinear stabilities
65P99 None of the above, but in this section
65Qxx **Difference and functional equations, recurrence relations**
65Q10 Difference equations
65Q20 Functional equations
65Q30 Recurrence relations
65Q99 None of the above, but in this section
65Rxx **Integral equations, integral transforms**
65R10 Integral transforms
65R20 Integral equations
65R30 Improperly posed problems
65R32 Inverse problems
65R99 None of the above, but in this section
65Sxx **Graphical methods**
65S05 Graphical methods
65S99 None of the above, but in this section
65Txx **Numerical methods in Fourier analysis**
65T40 Trigonometric approximation and interpolation
65T50 Discrete and fast Fourier transforms
65T60 Wavelets
65T99 None of the above, but in this section
65Yxx **Computer aspects of numerical algorithms**
65Y04 Algorithms for computer arithmetic, etc. [See also 68M07]
65Y05 Parallel computation
65Y10 Algorithms for specific classes of architectures
65Y15 Packaged methods
65Y20 Complexity and performance of numerical algorithms [See also 68Q25]
65Y99 None of the above, but in this section
65Zxx **Applications to physics**
65Z05 Applications to physics
65Z99 None of the above, but in this section

68-XX **COMPUTER SCIENCE {For papers involving machine computations and programs in a specific mathematical area, see Section–04 in that area}**
68-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
68-01 Instructional exposition (textbooks, tutorial papers, etc.)
68-02 Research exposition (monographs, survey articles)
68-03 Historical (must also be assigned at least one classification number from Section 01)
68-04 Explicit machine computation and programs (not the theory of computation or programming)
68-06 Proceedings, conferences, collections, etc.
68Mxx **Computer system organization**
68M01 General
68M07 Mathematical problems of computer architecture
68M10 Network design and communication [See also 68R10, 90B18]
68M11 Internet topics [See also 68U35]
68M12 Network protocols
68M14 Distributed systems
68M15 Reliability, testing and fault tolerance [See also 94C12]
68M20 Performance evaluation; queueing; scheduling [See also 60K25, 90Bxx]
68M99 None of the above, but in this section
68Nxx **Software**
68N01 General
68N15 Programming languages
68N17 Logic programming
68N18 Functional programming and lambda calculus [See also 03B40]
68N19 Other programming techniques (object-oriented, sequential, concurrent, automatic, etc.)
68N20 Compilers and interpreters
68N25 Operating systems
68N30 Mathematical aspects of software engineering (specification, verification, metrics, requirements, etc.)
68N99 None of the above, but in this section
68Pxx **Theory of data**
68P01 General
68P05 Data structures
68P10 Searching and sorting
68P15 Database theory
68P20 Information storage and retrieval
68P25 Data encryption [See also 94A60, 81P94]
68P30 Coding and information theory (compaction, compression, models of communication, encoding schemes, etc.) [See also 94Axx]
68P99 None of the above, but in this section
68Qxx **Theory of computing**
68Q01 General
68Q05 Models of computation (Turing machines, etc.) [See also 03D10, 68Q12, 81P68]
68Q10 Modes of computation (nondeterministic, parallel, interactive, probabilistic, etc.) [See also 68Q85]
68Q12 Quantum algorithms and complexity [See also 68Q05, 81P68]
68Q15 Complexity classes (hierarchies, relations among complexity classes, etc.) [See also 03D15, 68Q17, 68Q19]
68Q17 Computational difficulty of problems (lower bounds, completeness, difficulty of approximation, etc.) [See also 68Q15]
68Q19 Descriptive complexity and finite models [See also 03C13]
68Q25 Analysis of algorithms and problem complexity [See also 68W40]
68Q30 Algorithmic information theory (Kolmogorov complexity, etc.) [See also 03D32]
68Q32 Computational learning theory [See also 68T05]
68Q42 Grammars and rewriting systems
68Q45 Formal languages and automata [See also 03D05, 68Q70, 94A45]
68Q55 Semantics [See also 03B70, 06B35, 18C50]
68Q60 Specification and verification (program logics, model checking, etc.) [See also 03B70]
68Q65 Abstract data types; algebraic specification [See also 18C50]
68Q70 Algebraic theory of languages and automata [See also 18B20, 20M35]
68Q80 Cellular automata [See also 37B15]
68Q85 Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)
68Q87 Probability in computer science (algorithm analysis, random structures, phase transitions, etc.) [See also 68W20, 68W40]
68Q99 None of the above, but in this section
68Rxx **Discrete mathematics in relation to computer science**
68R01 General
68R05 Combinatorics
68R10 Graph theory (including graph drawing) [See also 05Cxx, 90B10, 90B35, 90C35]
68R15 Combinatorics on words
68R99 None of the above, but in this section
68Txx **Artificial intelligence**
68T01 General
68T05 Learning and adaptive systems [See also 68Q32, 91E40]
68T10 Pattern recognition, speech recognition {For cluster analysis, see 62H30}
68T15 Theorem proving (deduction, resolution, etc.) [See also 03B35]
68T20 Problem solving (heuristics, search strategies, etc.)
68T27 Logic in artificial intelligence
68T30 Knowledge representation
68T35 Languages and software systems (knowledge-based systems, expert systems, etc.)
68T37 Reasoning under uncertainty
68T40 Robotics [See also 93C85]
68T42 Agent technology
68T45 Machine vision and scene understanding
68T50 Natural language processing [See also 03B65]
68T99 None of the above, but in this section

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68Uxx **Computing methodologies and applications**
68U01 General
68U05 Computer graphics; computational geometry [See also 65D18]
68U07 Computer-aided design [See also 65D17]
68U10 Image processing
68U15 Text processing; mathematical typography
68U20 Simulation [See also 65Cxx]
68U35 Information systems (hypertext navigation, interfaces, decision support, etc.) [See also 68M11]
68U99 None of the above, but in this section
68Wxx **Algorithms {For numerical algorithms, see 65–XX; for combinatorics and graph theory, see 05C85, 68Rxx}**
68W01 General
68W05 Nonnumerical algorithms
68W10 Parallel algorithms
68W15 Distributed algorithms
68W20 Randomized algorithms
68W25 Approximation algorithms
68W27 Online algorithms
68W30 Symbolic computation and algebraic computation [See also 11Yxx, 12Y05, 13Pxx, 14Qxx, 16Z05, 17–08, 33F10]
68W32 Algorithms on strings
68W35 VLSI algorithms
68W40 Analysis of algorithms [See also 68Q25]
68W99 None of the above, but in this section

70-XX **MECHANICS OF PARTICLES AND SYSTEMS {For relativistic mechanics, see 83A05 and 83C10; for statistical mechanics, see 82-XX}**
70-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
70-01 Instructional exposition (textbooks, tutorial papers, etc.)
70-02 Research exposition (monographs, survey articles)
70-03 Historical (must also be assigned at least one classification number from Section 01)
70-04 Explicit machine computation and programs (not the theory of computation or programming)
70-05 Experimental work
70-06 Proceedings, conferences, collections, etc.
70-08 Computational methods
70Axx **Axiomatics, foundations**
70A05 Axiomatics, foundations
70A99 None of the above, but in this section
70Bxx **Kinematics [See also 53A17]**
70B05 Kinematics of a particle
70B10 Kinematics of a rigid body
70B15 Mechanisms, robots [See also 68T40, 70Q05, 93C85]
70B99 None of the above, but in this section
70Cxx **Statics**
70C20 Statics
70C99 None of the above, but in this section
70Exx **Dynamics of a rigid body and of multibody systems**
70E05 Motion of the gyroscope
70E15 Free motion of a rigid body [See also 70M20]
70E17 Motion of a rigid body with a fixed point
70E18 Motion of a rigid body in contact with a solid surface [See also 70F25]
70E20 Perturbation methods for rigid body dynamics
70E40 Integrable cases of motion
70E45 Higher-dimensional generalizations
70E50 Stability problems
70E55 Dynamics of multibody systems
70E60 Robot dynamics and control [See also 68T40, 70Q05, 93C85]
70E99 None of the above, but in this section
70Fxx **Dynamics of a system of particles, including celestial mechanics**
70F05 Two-body problems
70F07 Three-body problems
70F10 n-body problems
70F15 Celestial mechanics
70F16 Collisions in celestial mechanics, regularization
70F17 Inverse problems
70F20 Holonomic systems
70F25 Nonholonomic systems
70F35 Collision of rigid or pseudo-rigid bodies
70F40 Problems with friction
70F45 Infinite particle systems
70F99 None of the above, but in this section
70Gxx **General models, approaches, and methods [See also 37–XX]**
70G10 Generalized coordinates; event, impulse-energy, configuration, state, or phase space
70G40 Topological and differential-topological methods
70G45 Differential-geometric methods (tensors, connections, symplectic, Poisson, contact, Riemannian, nonholonomic, etc.) [See also 53Cxx, 53Dxx, 58Axx]
70G55 Algebraic geometry methods
70G60 Dynamical systems methods
70G65 Symmetries, Lie-group and Lie-algebra methods
70G70 Functional-analytic methods
70G75 Variational methods
70G99 None of the above, but in this section
70Hxx **Hamiltonian and Lagrangian mechanics [See also 37Jxx]**
70H03 Lagrange's equations
70H05 Hamilton's equations
70H06 Completely integrable systems and methods of integration
70H07 Nonintegrable systems
70H08 Nearly integrable Hamiltonian systems, KAM theory
70H09 Perturbation theories
70H11 Adiabatic invariants
70H12 Periodic and almost periodic solutions
70H14 Stability problems
70H15 Canonical and symplectic transformations
70H20 Hamilton-Jacobi equations
70H25 Hamilton's principle
70H30 Other variational principles
70H33 Symmetries and conservation laws, reverse symmetries, invariant manifolds and their bifurcations, reduction
70H40 Relativistic dynamics
70H45 Constrained dynamics, Dirac's theory of constraints [See also 70F20, 70F25, 70Gxx]
70H50 Higher-order theories
70H99 None of the above, but in this section
70Jxx **Linear vibration theory**
70J10 Modal analysis
70J25 Stability
70J30 Free motions
70J35 Forced motions
70J40 Parametric resonances
70J50 Systems arising from the discretization of structural vibration problems
70J99 None of the above, but in this section
70Kxx **Nonlinear dynamics [See also 34Cxx, 37–XX]**
70K05 Phase plane analysis, limit cycles
70K20 Stability
70K25 Free motions
70K28 Parametric resonances
70K30 Nonlinear resonances
70K40 Forced motions
70K42 Equilibria and periodic trajectories
70K43 Quasi-periodic motions and invariant tori
70K44 Homoclinic and heteroclinic trajectories
70K45 Normal forms
70K50 Bifurcations and instability
70K55 Transition to stochasticity (chaotic behavior) [See also 37D45]
70K60 General perturbation schemes
70K65 Averaging of perturbations
70K70 Systems with slow and fast motions
70K75 Nonlinear modes
70K99 None of the above, but in this section
70Lxx **Random vibrations [See also 74H50]**
70L05 Random vibrations [See also 74H50]
70L99 None of the above, but in this section
70Mxx **Orbital mechanics**
70M20 Orbital mechanics
70M99 None of the above, but in this section
70Pxx **Variable mass, rockets**
70P05 Variable mass, rockets
70P99 None of the above, but in this section
70Qxx **Control of mechanical systems [See also 60Gxx, 60Jxx]**
70Q05 Control of mechanical systems
70Q99 None of the above, but in this section
70Sxx **Classical field theories [See also 37Kxx, 37Lxx, 78–XX, 81Txx, 83–XX]**
70S05 Lagrangian formalism and Hamiltonian formalism
70S10 Symmetries and conservation laws
70S15 Yang-Mills and other gauge theories
70S20 More general nonquantum field theories
70S99 None of the above, but in this section

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74-XX **MECHANICS OF DEFORMABLE SOLIDS**
74-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
74-01 Instructional exposition (textbooks, tutorial papers, etc.)
74-02 Research exposition (monographs, survey articles)
74-03 Historical (must also be assigned at least one classification number from Section 01)
74-04 Explicit machine computation and programs (not the theory of computation or programming)
74-05 Experimental work
74-06 Proceedings, conferences, collections, etc.
74Axx **Generalities, axiomatics, foundations of continuum mechanics of solids**
74A05 Kinematics of deformation
74A10 Stress
74A15 Thermodynamics
74A20 Theory of constitutive functions
74A25 Molecular, statistical, and kinetic theories
74A30 Nonsimple materials
74A35 Polar materials
74A40 Random materials and composite materials
74A45 Theories of fracture and damage
74A50 Structured surfaces and interfaces, coexistent phases
74A55 Theories of friction (tribology)
74A60 Micromechanical theories
74A65 Reactive materials
74A99 None of the above, but in this section
74Bxx **Elastic materials**
74B05 Classical linear elasticity
74B10 Linear elasticity with initial stresses
74B15 Equations linearized about a deformed state (small deformations superposed on large)
74B20 Nonlinear elasticity
74B99 None of the above, but in this section
74Cxx **Plastic materials, materials of stress-rate and internal-variable type**
74C05 Small-strain, rate-independent theories (including rigid-plastic and elasto-plastic materials)
74C10 Small-strain, rate-dependent theories (including theories of viscoplasticity)
74C15 Large-strain, rate-independent theories (including nonlinear plasticity)
74C20 Large-strain, rate-dependent theories
74C99 None of the above, but in this section
74Dxx **Materials of strain-rate type and history type, other materials with memory (including elastic materials with viscous damping, various viscoelastic materials)**
74D05 Linear constitutive equations
74D10 Nonlinear constitutive equations
74D99 None of the above, but in this section
74Exx **Material properties given special treatment**
74E05 Inhomogeneity
74E10 Anisotropy
74E15 Crystalline structure
74E20 Granularity
74E25 Texture
74E30 Composite and mixture properties
74E35 Random structure
74E40 Chemical structure
74E99 None of the above, but in this section
74Fxx **Coupling of solid mechanics with other effects**
74F05 Thermal effects
74F10 Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)
74F15 Electromagnetic effects
74F20 Mixture effects
74F25 Chemical and reactive effects
74F99 None of the above, but in this section
74Gxx **Equilibrium (steady-state) problems**
74G05 Explicit solutions
74G10 Analytic approximation of solutions (perturbation methods, asymptotic methods, series, etc.)
74G15 Numerical approximation of solutions
74G20 Local existence of solutions (near a given solution)
74G25 Global existence of solutions
74G30 Uniqueness of solutions
74G35 Multiplicity of solutions
74G40 Regularity of solutions
74G45 Bounds for solutions
74G50 Saint-Venant's principle
74G55 Qualitative behavior of solutions
74G60 Bifurcation and buckling
74G65 Energy minimization
74G70 Stress concentrations, singularities
74G75 Inverse problems
74G99 None of the above, but in this section
74Hxx **Dynamical problems**
74H05 Explicit solutions
74H10 Analytic approximation of solutions (perturbation methods, asymptotic methods, series, etc.)
74H15 Numerical approximation of solutions
74H20 Existence of solutions
74H25 Uniqueness of solutions
74H30 Regularity of solutions
74H35 Singularities, blowup, stress concentrations
74H40 Long-time behavior of solutions
74H45 Vibrations
74H50 Random vibrations
74H55 Stability
74H60 Dynamical bifurcation
74H65 Chaotic behavior
74H99 None of the above, but in this section
74Jxx **Waves**
74J05 Linear waves
74J10 Bulk waves
74J15 Surface waves
74J20 Wave scattering
74J25 Inverse problems
74J30 Nonlinear waves
74J35 Solitary waves
74J40 Shocks and related discontinuities
74J99 None of the above, but in this section
74Kxx **Thin bodies, structures**
74K05 Strings
74K10 Rods (beams, columns, shafts, arches, rings, etc.)
74K15 Membranes
74K20 Plates
74K25 Shells
74K30 Junctions
74K35 Thin films
74K99 None of the above, but in this section
74Lxx **Special subfields of solid mechanics**
74L05 Geophysical solid mechanics [See also 86–XX]
74L10 Soil and rock mechanics
74L15 Biomechanical solid mechanics [See also 92C10]
74L99 None of the above, but in this section
74Mxx **Special kinds of problems**
74M05 Control, switches and devices ("smart materials") [See also 93Cxx]
74M10 Friction
74M15 Contact
74M20 Impact
74M25 Micromechanics
74M99 None of the above, but in this section
74Nxx **Phase transformations in solids [See also 74A50, 80Axx, 82B26, 82C26]**
74N05 Crystals
74N10 Displacive transformations
74N15 Analysis of microstructure
74N20 Dynamics of phase boundaries
74N25 Transformations involving diffusion
74N30 Problems involving hysteresis
74N99 None of the above, but in this section
74Pxx **Optimization [See also 49Qxx]**
74P05 Compliance or weight optimization
74P10 Optimization of other properties
74P15 Topological methods
74P20 Geometrical methods
74P99 None of the above, but in this section
74Qxx **Homogenization, determination of effective properties**
74Q05 Homogenization in equilibrium problems
74Q10 Homogenization and oscillations in dynamical problems
74Q15 Effective constitutive equations
74Q20 Bounds on effective properties
74Q99 None of the above, but in this section
74Rxx **Fracture and damage**
74R05 Brittle damage
74R10 Brittle fracture
74R15 High-velocity fracture
74R20 Anelastic fracture and damage
74R99 None of the above, but in this section

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74Sxx **Numerical methods [See also 65–XX, 74G15, 74H15]**
74S05 Finite element methods
74S10 Finite volume methods
74S15 Boundary element methods
74S20 Finite difference methods
74S25 Spectral and related methods
74S30 Other numerical methods
74S60 Stochastic methods
74S70 Complex variable methods
74S99 None of the above, but in this section

76-XX **FLUID MECHANICS {For general continuum mechanics, see 74Axx, or other parts of 74-XX}**
76-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
76-01 Instructional exposition (textbooks, tutorial papers, etc.)
76-02 Research exposition (monographs, survey articles)
76-03 Historical (must also be assigned at least one classification number from Section 01)
76-04 Explicit machine computation and programs (not the theory of computation or programming)
76-05 Experimental work
76-06 Proceedings, conferences, collections, etc.
76Axx **Foundations, constitutive equations, rheology**
76A02 Foundations of fluid mechanics
76A05 Non-Newtonian fluids
76A10 Viscoelastic fluids
76A15 Liquid crystals [See also 82D30]
76A20 Thin fluid films
76A25 Superfluids (classical aspects)
76A99 None of the above, but in this section
76Bxx **Incompressible inviscid fluids**
76B03 Existence, uniqueness, and regularity theory [See also 35Q35]
76B07 Free-surface potential flows
76B10 Jets and cavities, cavitation, free-streamline theory, water-entry problems, airfoil and hydrofoil theory, sloshing
76B15 Water waves, gravity waves; dispersion and scattering, nonlinear interaction [See also 35Q30]
76B20 Ship waves
76B25 Solitary waves [See also 35C11]
76B45 Capillarity (surface tension) [See also 76D45]
76B47 Vortex flows
76B55 Internal waves
76B60 Atmospheric waves [See also 86A10]
76B65 Rossby waves [See also 86A05, 86A10]
76B70 Stratification effects in inviscid fluids
76B75 Flow control and optimization [See also 49Q10, 93C20, 93C95]
76B99 None of the above, but in this section
76Dxx **Incompressible viscous fluids**
76D03 Existence, uniqueness, and regularity theory [See also 35Q30]
76D05 Navier-Stokes equations [See also 35Q30]
76D06 Statistical solutions of Navier-Stokes and related equations [See also 60H30, 76M35]
76D07 Stokes and related (Oseen, etc.) flows
76D08 Lubrication theory
76D09 Viscous-inviscid interaction
76D10 Boundary-layer theory, separation and reattachment, higher-order effects
76D17 Viscous vortex flows
76D25 Wakes and jets
76D27 Other free-boundary flows; Hele-Shaw flows
76D33 Waves
76D45 Capillarity (surface tension) [See also 76B45]
76D50 Stratification effects in viscous fluids
76D55 Flow control and optimization [See also 49Q10, 93C20, 93C95]
76D99 None of the above, but in this section
76Exx **Hydrodynamic stability**
76E05 Parallel shear flows
76E06 Convection
76E07 Rotation
76E09 Stability and instability of nonparallel flows
76E15 Absolute and convective instability and stability
76E17 Interfacial stability and instability
76E19 Compressibility effects
76E20 Stability and instability of geophysical and astrophysical flows
76E25 Stability and instability of magnetohydrodynamic and electrohydrodynamic flows
76E30 Nonlinear effects
76E99 None of the above, but in this section
76Fxx **Turbulence [See also 37–XX, 60Gxx, 60Jxx]**
76F02 Fundamentals
76F05 Isotropic turbulence; homogeneous turbulence
76F06 Transition to turbulence
76F10 Shear flows
76F20 Dynamical systems approach to turbulence [See also 37–XX]
76F25 Turbulent transport, mixing
76F30 Renormalization and other field-theoretical methods [See also 81T99]
76F35 Convective turbulence [See also 76E15, 76Rxx]
76F40 Turbulent boundary layers
76F45 Stratification effects
76F50 Compressibility effects
76F55 Statistical turbulence modeling [See also 76M35]
76F60 k-ε modeling
76F65 Direct numerical and large eddy simulation of turbulence
76F70 Control of turbulent flows
76F99 None of the above, but in this section
76Gxx **General aerodynamics and subsonic flows**
76G25 General aerodynamics and subsonic flows
76G99 None of the above, but in this section
76Hxx **Transonic flows**
76H05 Transonic flows
76H99 None of the above, but in this section
76Jxx **Supersonic flows**
76J20 Supersonic flows
76J99 None of the above, but in this section
76Kxx **Hypersonic flows**
76K05 Hypersonic flows
76K99 None of the above, but in this section
76Lxx **Shock waves and blast waves [See also 35L67]**
76L05 Shock waves and blast waves [See also 35L67]
76L99 None of the above, but in this section
76Mxx **Basic methods in fluid mechanics [See also 65–XX]**
76M10 Finite element methods
76M12 Finite volume methods
76M15 Boundary element methods
76M20 Finite difference methods
76M22 Spectral methods
76M23 Vortex methods
76M25 Other numerical methods
76M27 Visualization algorithms
76M28 Particle methods and lattice-gas methods
76M30 Variational methods
76M35 Stochastic analysis
76M40 Complex-variables methods
76M45 Asymptotic methods, singular perturbations
76M50 Homogenization
76M55 Dimensional analysis and similarity
76M60 Symmetry analysis, Lie group and algebra methods
76M99 None of the above, but in this section
76Nxx **Compressible fluids and gas dynamics, general**
76N10 Existence, uniqueness, and regularity theory [See also 35L60, 35L65, 35Q30]
76N15 Gas dynamics, general
76N17 Viscous-inviscid interaction
76N20 Boundary-layer theory
76N25 Flow control and optimization
76N99 None of the above, but in this section
76Pxx **Rarefied gas flows, Boltzmann equation [See also 82B40, 82C40, 82D05]**
76P05 Rarefied gas flows, Boltzmann equation [See also 82B40, 82C40, 82D05]
76P99 None of the above, but in this section
76Qxx **Hydro- and aero-acoustics**
76Q05 Hydro- and aero-acoustics
76Q99 None of the above, but in this section
76Rxx **Diffusion and convection**
76R05 Forced convection
76R10 Free convection
76R50 Diffusion [See also 60J60]
76R99 None of the above, but in this section
76Sxx **Flows in porous media; filtration; seepage**
76S05 Flows in porous media; filtration; seepage
76S99 None of the above, but in this section
76Txx **Two-phase and multiphase flows**
76T10 Liquid-gas two-phase flows, bubbly flows
76T15 Dusty-gas two-phase flows
76T20 Suspensions
76T25 Granular flows [See also 74C99, 74E20]
76T30 Three or more component flows

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76T99 None of the above, but in this section
76Uxx **Rotating fluids**
76U05 Rotating fluids
76U99 None of the above, but in this section
76Vxx **Reaction effects in flows [See also 80A32]**
76V05 Reaction effects in flows [See also 80A32]
76V99 None of the above, but in this section
76Wxx **Magnetohydrodynamics and electrohydrodynamics**
76W05 Magnetohydrodynamics and electrohydrodynamics
76W99 None of the above, but in this section
76Xxx **Ionized gas flow in electromagnetic fields; plasmic flow [See also 82D10]**
76X05 Ionized gas flow in electromagnetic fields; plasmic flow [See also 82D10]
76X99 None of the above, but in this section
76Yxx **Quantum hydrodynamics and relativistic hydrodynamics [See also 82D50, 83C55, 85A30]**
76Y05 Quantum hydrodynamics and relativistic hydrodynamics [See also 82D50, 83C55, 85A30]
76Y99 None of the above, but in this section
76Zxx **Biological fluid mechanics [See also 74F10, 74L15, 92Cxx]**
76Z05 Physiological flows [See also 92C35]
76Z10 Biopropulsion in water and in air
76Z99 None of the above, but in this section

78-XX **OPTICS, ELECTROMAGNETIC THEORY {For quantum optics, see 81V80}**
78-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
78-01 Instructional exposition (textbooks, tutorial papers, etc.)
78-02 Research exposition (monographs, survey articles)
78-03 Historical (must also be assigned at least one classification number from Section 01)
78-04 Explicit machine computation and programs (not the theory of computation or programming)
78-05 Experimental work
78-06 Proceedings, conferences, collections, etc.
78Axx **General**
78A02 Foundations
78A05 Geometric optics
78A10 Physical optics
78A15 Electron optics
78A20 Space charge waves
78A25 Electromagnetic theory, general
78A30 Electro- and magnetostatics
78A35 Motion of charged particles
78A37 Ion traps
78A40 Waves and radiation
78A45 Diffraction, scattering [See also 34E20 for WKB methods]
78A46 Inverse scattering problems
78A48 Composite media; random media
78A50 Antennas, wave-guides
78A55 Technical applications
78A57 Electrochemistry
78A60 Lasers, masers, optical bistability, nonlinear optics [See also 81V80]
78A70 Biological applications [See also 91D30, 92C30]
78A97 Mathematically heuristic optics and electromagnetic theory (must also be assigned at least one other classification number in this section)
78A99 Miscellaneous topics
78Mxx **Basic methods**
78M05 Method of moments
78M10 Finite element methods
78M12 Finite volume methods, finite integration techniques
78M15 Boundary element methods
78M16 Multipole methods
78M20 Finite difference methods
78M22 Spectral methods
78M25 Other numerical methods
78M30 Variational methods
78M31 Monte Carlo methods
78M32 Neural and heuristic methods
78M34 Model reduction
78M35 Asymptotic analysis
78M40 Homogenization
78M50 Optimization
78M99 None of the above, but in this section

80-XX **CLASSICAL THERMODYNAMICS, HEAT TRANSFER {For thermodynamics of solids, see 74A15}**
80-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
80-01 Instructional exposition (textbooks, tutorial papers, etc.)
80-02 Research exposition (monographs, survey articles)
80-03 Historical (must also be assigned at least one classification number from Section 01)
80-04 Explicit machine computation and programs (not the theory of computation or programming)
80-05 Experimental work
80-06 Proceedings, conferences, collections, etc.
80Axx **Thermodynamics and heat transfer**
80A05 Foundations
80A10 Classical thermodynamics, including relativistic
80A17 Thermodynamics of continua [See also 74A15]
80A20 Heat and mass transfer, heat flow
80A22 Stefan problems, phase changes, etc. [See also 74Nxx]
80A23 Inverse problems
80A25 Combustion
80A30 Chemical kinetics [See also 76V05, 92C45, 92E20]
80A32 Chemically reacting flows [See also 92C45, 92E20]
80A50 Chemistry (general) [See mainly 92Exx]
80A99 None of the above, but in this section
80Mxx **Basic methods**
80M10 Finite element methods
80M12 Finite volume methods
80M15 Boundary element methods
80M20 Finite difference methods
80M22 Spectral methods
80M25 Other numerical methods
80M30 Variational methods
80M31 Monte Carlo methods
80M35 Asymptotic analysis
80M40 Homogenization
80M50 Optimization
80M99 None of the above, but in this section

81-XX **QUANTUM THEORY**
81-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
81-01 Instructional exposition (textbooks, tutorial papers, etc.)
81-02 Research exposition (monographs, survey articles)
81-03 Historical (must also be assigned at least one classification number from Section 01)
81-04 Explicit machine computation and programs (not the theory of computation or programming)
81-05 Experimental papers
81-06 Proceedings, conferences, collections, etc.
81-08 Computational methods
81Pxx **Axiomatics, foundations, philosophy**
81P05 General and philosophical
81P10 Logical foundations of quantum mechanics; quantum logic [See also 03G12, 06C15]
81P13 Contextuality
81P15 Quantum measurement theory
81P16 Quantum state spaces, operational and probabilistic concepts
81P20 Stochastic mechanics (including stochastic electrodynamics)
81P40 Quantum coherence, entanglement, quantum correlations
81P45 Quantum information, communication, networks [See also 94A15, 94A17]
81P50 Quantum state estimation, approximate cloning
81P68 Quantum computation [See also 68Q05, 68Q12]
81P70 Quantum coding (general)
81P94 Quantum cryptography [See also 94A60]
81P99 None of the above, but in this section
81Qxx **General mathematical topics and methods in quantum theory**
81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics
81Q10 Selfadjoint operator theory in quantum theory, including spectral analysis
81Q12 Non-selfadjoint operator theory in quantum theory
81Q15 Perturbation theories for operators and differential equations
81Q20 Semiclassical techniques, including WKB and Maslov methods
81Q30 Feynman integrals and graphs; applications of algebraic topology and algebraic geometry [See also 14D05, 32S40]
81Q35 Quantum mechanics on special spaces: manifolds, fractals, graphs, etc.
81Q37 Quantum dots, waveguides, ratchets, etc.
81Q40 Bethe-Salpeter and other integral equations
81Q50 Quantum chaos [See also 37Dxx]

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81Q60 Supersymmetry and quantum mechanics
81Q65 Alternative quantum mechanics
81Q70 Differential-geometric methods, including holonomy, Berry and Hannay phases, etc.
81Q80 Special quantum systems, such as solvable systems
81Q93 Quantum control
81Q99 None of the above, but in this section

81Rxx **Groups and algebras in quantum theory**
81R05 Finite-dimensional groups and algebras motivated by physics and their representations [See also 20C35, 22E70]
81R10 Infinite-dimensional groups and algebras motivated by physics, including Virasoro, Kac-Moody, W-algebras and other current algebras and their representations [See also 17B65, 17B67, 22E65, 22E67, 22E70]
81R12 Relations with integrable systems [See also 17Bxx, 37J35]
81R15 Operator algebra methods [See also 46Lxx, 81T05]
81R20 Covariant wave equations
81R25 Spinor and twistor methods [See also 32L25]
81R30 Coherent states [See also 22E45]; squeezed states [See also 81V80]
81R40 Symmetry breaking
81R50 Quantum groups and related algebraic methods [See also 16T20, 17B37]
81R60 Noncommutative geometry
81R99 None of the above, but in this section

81Sxx **General quantum mechanics and problems of quantization**
81S05 Canonical quantization, commutation relations and statistics
81S10 Geometry and quantization, symplectic methods [See also 53D50]
81S20 Stochastic quantization
81S22 Open systems, reduced dynamics, master equations, decoherence [See also 82C31]
81S25 Quantum stochastic calculus
81S30 Phase-space methods including Wigner distributions, etc.
81S40 Path integrals [See also 58D30]
81S99 None of the above, but in this section

81Txx **Quantum field theory; related classical field theories [See also 70Sxx]**
81T05 Axiomatic quantum field theory; operator algebras
81T08 Constructive quantum field theory
81T10 Model quantum field theories
81T13 Yang-Mills and other gauge theories [See also 53C07, 58E15]
81T15 Perturbative methods of renormalization
81T16 Nonperturbative methods of renormalization
81T17 Renormalization group methods
81T18 Feynman diagrams
81T20 Quantum field theory on curved space backgrounds
81T25 Quantum field theory on lattices
81T27 Continuum limits
81T28 Thermal quantum field theory [See also 82B30]
81T30 String and superstring theories; other extended objects (e.g., branes) [See also 83E30]
81T40 Two-dimensional field theories, conformal field theories, etc.
81T45 Topological field theories [See also 57R56, 58Dxx]
81T50 Anomalies
81T55 Casimir effect
81T60 Supersymmetric field theories
81T70 Quantization in field theory; cohomological methods [See also 58D29]
81T75 Noncommutative geometry methods [See also 46L85, 46L87, 58B34]
81T80 Simulation and numerical modeling
81T99 None of the above, but in this section

81Uxx **Scattering theory [See also 34A55, 34L25, 34L40, 35P25, 47A40]**
81U05 2-body potential scattering theory [See also 34E20 for WKB methods]
81U10 n-body potential scattering theory
81U15 Exactly and quasi-solvable systems
81U20 S-matrix theory, etc.
81U30 Dispersion theory, dispersion relations
81U35 Inelastic and multichannel scattering
81U40 Inverse scattering problems
81U99 None of the above, but in this section

81Vxx **Applications to specific physical systems**
81V05 Strong interaction, including quantum chromodynamics
81V10 Electromagnetic interaction; quantum electrodynamics
81V15 Weak interaction
81V17 Gravitational interaction [See also 83Cxx and 83Exx]
81V19 Other fundamental interactions
81V22 Unified theories
81V25 Other elementary particle theory
81V35 Nuclear physics
81V45 Atomic physics
81V55 Molecular physics [See also 92E10]
81V65 Quantum dots [See also 82D20]
81V70 Many-body theory; quantum Hall effect
81V80 Quantum optics
81V99 None of the above, but in this section

82-XX **STATISTICAL MECHANICS, STRUCTURE OF MATTER**
82-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
82-01 Instructional exposition (textbooks, tutorial papers, etc.)
82-02 Research exposition (monographs, survey articles)
82-03 Historical (must also be assigned at least one classification number from Section 01)
82-04 Explicit machine computation and programs (not the theory of computation or programming)
82-05 Experimental papers
82-06 Proceedings, conferences, collections, etc.
82-08 Computational methods

82Bxx **Equilibrium statistical mechanics**
82B03 Foundations
82B05 Classical equilibrium statistical mechanics (general)
82B10 Quantum equilibrium statistical mechanics (general)
82B20 Lattice systems (Ising, dimer, Potts, etc.) and systems on graphs
82B21 Continuum models (systems of particles, etc.)
82B23 Exactly solvable models; Bethe ansatz
82B24 Interface problems; diffusion-limited aggregation
82B26 Phase transitions (general)
82B27 Critical phenomena
82B28 Renormalization group methods [See also 81T17]
82B30 Statistical thermodynamics [See also 80–XX]
82B31 Stochastic methods
82B35 Irreversible thermodynamics, including Onsager-Machlup theory [See also 92E20]
82B40 Kinetic theory of gases
82B41 Random walks, random surfaces, lattice animals, etc. [See also 60G50, 82C41]
82B43 Percolation [See also 60K35]
82B44 Disordered systems (random Ising models, random Schrödinger operators, etc.)
82B80 Numerical methods (Monte Carlo, series resummation, etc.) [See also 65–XX, 81T80]
82B99 None of the above, but in this section

82Cxx **Time-dependent statistical mechanics (dynamic and nonequilibrium)**
82C03 Foundations
82C05 Classical dynamic and nonequilibrium statistical mechanics (general)
82C10 Quantum dynamics and nonequilibrium statistical mechanics (general)
82C20 Dynamic lattice systems (kinetic Ising, etc.) and systems on graphs
82C21 Dynamic continuum models (systems of particles, etc.)
82C22 Interacting particle systems [See also 60K35]
82C23 Exactly solvable dynamic models [See also 37K60]
82C24 Interface problems; diffusion-limited aggregation
82C26 Dynamic and nonequilibrium phase transitions (general)
82C27 Dynamic critical phenomena
82C28 Dynamic renormalization group methods [See also 81T17]
82C31 Stochastic methods (Fokker-Planck, Langevin, etc.) [See also 60H10]
82C32 Neural nets [See also 68T05, 91E40, 92B20]
82C35 Irreversible thermodynamics, including Onsager-Machlup theory
82C40 Kinetic theory of gases
82C41 Dynamics of random walks, random surfaces, lattice animals, etc. [See also 60G50]
82C43 Time-dependent percolation [See also 60K35]
82C44 Dynamics of disordered systems (random Ising systems, etc.)
82C70 Transport processes
82C80 Numerical methods (Monte Carlo, series resummation, etc.)
82C99 None of the above, but in this section

82Dxx **Applications to specific types of physical systems**
82D05 Gases
82D10 Plasmas
82D15 Liquids
82D20 Solids
82D25 Crystals {For crystallographic group theory, see 20H15}
82D30 Random media, disordered materials (including liquid crystals and spin glasses)
82D35 Metals
82D37 Semiconductors
82D40 Magnetic materials
82D45 Ferroelectrics
82D50 Superfluids
82D55 Superconductors
82D60 Polymers
82D75 Nuclear reactor theory; neutron transport
82D77 Quantum wave guides, quantum wires [See also 78A50]

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82D80 Nanostructures and nanoparticles
82D99 None of the above, but in this section

83-XX RELATIVITY AND GRAVITATIONAL THEORY
83-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
83-01 Instructional exposition (textbooks, tutorial papers, etc.)
83-02 Research exposition (monographs, survey articles)
83-03 Historical (must also be assigned at least one classification number from Section 01)
83-04 Explicit machine computation and programs (not the theory of computation or programming)
83-05 Experimental work
83-06 Proceedings, conferences, collections, etc.
83-08 Computational methods
83Axx Special relativity
83A05 Special relativity
83A99 None of the above, but in this section
83Bxx Observational and experimental questions
83B05 Observational and experimental questions
83B99 None of the above, but in this section
83Cxx General relativity
83C05 Einstein's equations (general structure, canonical formalism, Cauchy problems)
83C10 Equations of motion
83C15 Exact solutions
83C20 Classes of solutions; algebraically special solutions, metrics with symmetries
83C22 Einstein-Maxwell equations
83C25 Approximation procedures, weak fields
83C27 Lattice gravity, Regge calculus and other discrete methods
83C30 Asymptotic procedures (radiation, news functions, H-spaces, etc.)
83C35 Gravitational waves
83C40 Gravitational energy and conservation laws; groups of motions
83C45 Quantization of the gravitational field
83C47 Methods of quantum field theory [See also 81T20]
83C50 Electromagnetic fields
83C55 Macroscopic interaction of the gravitational field with matter (hydrodynamics, etc.)
83C57 Black holes
83C60 Spinor and twistor methods; Newman-Penrose formalism
83C65 Methods of noncommutative geometry [See also 58B34]
83C75 Space-time singularities, cosmic censorship, etc.
83C80 Analogues in lower dimensions
83C99 None of the above, but in this section
83Dxx Relativistic gravitational theories other than Einstein's, including asymmetric field theories
83D05 Relativistic gravitational theories other than Einstein's, including asymmetric field theories
83D99 None of the above, but in this section
83Exx Unified, higher-dimensional and super field theories
83E05 Geometrodynamics
83E15 Kaluza-Klein and other higher-dimensional theories
83E30 String and superstring theories [See also 81T30]
83E50 Supergravity
83E99 None of the above, but in this section
83Fxx Cosmology
83F05 Cosmology
83F99 None of the above, but in this section

85-XX ASTRONOMY AND ASTROPHYSICS {For celestial mechanics, see 70F15}
85-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
85-01 Instructional exposition (textbooks, tutorial papers, etc.)
85-02 Research exposition (monographs, survey articles)
85-03 Historical (must also be assigned at least one classification number from Section 01)
85-04 Explicit machine computation and programs (not the theory of computation or programming)
85-05 Experimental work
85-06 Proceedings, conferences, collections, etc.
85-08 Computational methods
85Axx Astronomy and astrophysics {For celestial mechanics, see 70F15}
85A04 General
85A05 Galactic and stellar dynamics
85A15 Galactic and stellar structure
85A20 Planetary atmospheres
85A25 Radiative transfer
85A30 Hydrodynamic and hydromagnetic problems [See also 76Y05]
85A35 Statistical astronomy
85A40 Cosmology {For relativistic cosmology, see 83F05}
85A99 Miscellaneous topics

86-XX GEOPHYSICS [See also 76U05, 76V05]
86-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
86-01 Instructional exposition (textbooks, tutorial papers, etc.)
86-02 Research exposition (monographs, survey articles)
86-03 Historical (must also be assigned at least one classification number from Section 01)
86-04 Explicit machine computation and programs (not the theory of computation or programming)
86-05 Experimental work
86-06 Proceedings, conferences, collections, etc.
86-08 Computational methods
86Axx Geophysics [See also 76U05, 76V05]
86A04 General
86A05 Hydrology, hydrography, oceanography [See also 76Bxx, 76E20, 76Q05, 76Rxx, 76U05]
86A10 Meteorology and atmospheric physics [See also 76Bxx, 76E20, 76N15, 76Q05, 76Rxx, 76U05]
86A15 Seismology
86A17 Global dynamics, earthquake problems
86A20 Potentials, prospecting
86A22 Inverse problems [See also 35R30]
86A25 Geo-electricity and geomagnetism [See also 76W05, 78A25]
86A30 Geodesy, mapping problems
86A32 Geostatistics
86A40 Glaciology
86A60 Geological problems
86A99 Miscellaneous topics

90-XX OPERATIONS RESEARCH, MATHEMATICAL PROGRAMMING
90-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
90-01 Instructional exposition (textbooks, tutorial papers, etc.)
90-02 Research exposition (monographs, survey articles)
90-03 Historical (must also be assigned at least one classification number from Section 01)
90-04 Explicit machine computation and programs (not the theory of computation or programming)
90-06 Proceedings, conferences, collections, etc.
90-08 Computational methods
90Bxx Operations research and management science
90B05 Inventory, storage, reservoirs
90B06 Transportation, logistics
90B10 Network models, deterministic
90B15 Network models, stochastic
90B18 Communication networks [See also 68M10, 94A05]
90B20 Traffic problems
90B22 Queues and service [See also 60K25, 68M20]
90B25 Reliability, availability, maintenance, inspection [See also 60K10, 62N05]
90B30 Production models
90B35 Scheduling theory, deterministic [See also 68M20]
90B36 Scheduling theory, stochastic [See also 68M20]
90B40 Search theory
90B50 Management decision making, including multiple objectives [See also 90C29, 90C31, 91A35, 91B06]
90B60 Marketing, advertising [See also 91B60]
90B70 Theory of organizations, manpower planning [See also 91D35]
90B80 Discrete location and assignment [See also 90C10]
90B85 Continuous location
90B90 Case-oriented studies
90B99 None of the above, but in this section
90Cxx Mathematical programming [See also 49Mxx, 65Kxx]
90C05 Linear programming
90C06 Large-scale problems
90C08 Special problems of linear programming (transportation, multi-index, etc.)
90C09 Boolean programming
90C10 Integer programming
90C11 Mixed integer programming
90C15 Stochastic programming
90C20 Quadratic programming
90C22 Semidefinite programming
90C25 Convex programming
90C26 Nonconvex programming, global optimization
90C27 Combinatorial optimization
90C29 Multi-objective and goal programming
90C30 Nonlinear programming

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90C31 Sensitivity, stability, parametric optimization
90C32 Fractional programming
90C33 Complementarity and equilibrium problems and variational inequalities (finite dimensions)
90C34 Semi-infinite programming
90C35 Programming involving graphs or networks [See also 90C27]
90C39 Dynamic programming [See also 49L20]
90C40 Markov and semi-Markov decision processes
90C46 Optimality conditions, duality [See also 49N15]
90C47 Minimax problems [See also 49K35]
90C48 Programming in abstract spaces
90C49 Extreme-point and pivoting methods
90C51 Interior-point methods
90C52 Methods of reduced gradient type
90C53 Methods of quasi-Newton type
90C55 Methods of successive quadratic programming type
90C56 Derivative-free methods and methods using generalized derivatives [See also 49J52]
90C57 Polyhedral combinatorics, branch-and-bound, branch-and-cut
90C59 Approximation methods and heuristics
90C60 Abstract computational complexity for mathematical programming problems [See also 68Q25]
90C70 Fuzzy programming
90C90 Applications of mathematical programming
90C99 None of the above, but in this section

91-XX **GAME THEORY, ECONOMICS, SOCIAL AND BEHAVIORAL SCIENCES**
91-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
91-01 Instructional exposition (textbooks, tutorial papers, etc.)
91-02 Research exposition (monographs, survey articles)
91-03 Historical (must also be assigned at least one classification number from section 01)
91-04 Explicit machine computation and programs (not the theory of computation or programming)
91-06 Proceedings, conferences, collections, etc.
91-08 Computational methods
91Axx **Game theory**
91A05 2-person games
91A06 n-person games, $n > 2$
91A10 Noncooperative games
91A12 Cooperative games
91A13 Games with infinitely many players
91A15 Stochastic games
91A18 Games in extensive form
91A20 Multistage and repeated games
91A22 Evolutionary games
91A23 Differential games [See also 49N70]
91A24 Positional games (pursuit and evasion, etc.) [See also 49N75]
91A25 Dynamic games
91A26 Rationality, learning
91A28 Signaling, communication
91A30 Utility theory for games [See also 91B16]
91A35 Decision theory for games [See also 62Cxx, 91B06, 90B50]
91A40 Game-theoretic models
91A43 Games involving graphs [See also 05C57]
91A44 Games involving topology or set theory
91A46 Combinatorial games
91A50 Discrete-time games
91A55 Games of timing
91A60 Probabilistic games; gambling [See also 60G40]
91A65 Hierarchical games
91A70 Spaces of games
91A80 Applications of game theory
91A90 Experimental studies
91A99 None of the above, but in this section
91Bxx **Mathematical economics {For econometrics, see 62P20}**
91B02 Fundamental topics (basic mathematics, methodology; applicable to economics in general)
91B06 Decision theory [See also 62Cxx, 90B50, 91A35]
91B08 Individual preferences
91B10 Group preferences
91B12 Voting theory
91B14 Social choice
91B15 Welfare economics
91B16 Utility theory
91B18 Public goods
91B24 Price theory and market structure
91B25 Asset pricing models
91B26 Market models (auctions, bargaining, bidding, selling, etc.)
91B30 Risk theory, insurance
91B32 Resource and cost allocation
91B38 Production theory, theory of the firm
91B40 Labor market, contracts
91B42 Consumer behavior, demand theory
91B44 Informational economics
91B50 General equilibrium theory
91B51 Dynamic stochastic general equilibrium theory
91B52 Special types of equilibria
91B54 Special types of economies
91B55 Economic dynamics
91B60 Trade models
91B62 Growth models
91B64 Macro-economic models (monetary models, models of taxation)
91B66 Multisectoral models
91B68 Matching models
91B69 Heterogeneous agent models
91B70 Stochastic models
91B72 Spatial models
91B74 Models of real-world systems
91B76 Environmental economics (natural resource models, harvesting, pollution, etc.)
91B80 Applications of statistical and quantum mechanics to economics (econophysics)
91B82 Statistical methods; economic indices and measures
91B84 Economic time series analysis [See also 62M10]
91B99 None of the above, but in this section
91Cxx **Social and behavioral sciences: general topics {For statistics, see 62–XX}**
91C05 Measurement theory
91C15 One- and multidimensional scaling
91C20 Clustering [See also 62H30]
91C99 None of the above, but in this section
91Dxx **Mathematical sociology (including anthropology)**
91D10 Models of societies, social and urban evolution
91D20 Mathematical geography and demography
91D25 Spatial models [See also 91B72]
91D30 Social networks
91D35 Manpower systems [See also 91B40, 90B70]
91D99 None of the above, but in this section
91Exx **Mathematical psychology**
91E10 Cognitive psychology
91E30 Psychophysics and psychophysiology; perception
91E40 Memory and learning [See also 68T05]
91E45 Measurement and performance
91E99 None of the above, but in this section
91Fxx **Other social and behavioral sciences (mathematical treatment)**
91F10 History, political science
91F20 Linguistics [See also 03B65, 68T50]
91F99 None of the above, but in this section
91Gxx **Mathematical finance**
91G10 Portfolio theory
91G20 Derivative securities
91G30 Interest rates (stochastic models)
91G40 Credit risk
91G50 Corporate finance
91G60 Numerical methods (including Monte Carlo methods)
91G70 Statistical methods, econometrics
91G80 Financial applications of other theories (stochastic control, calculus of variations, PDE, SPDE, dynamical systems)
91G99 None of the above, but in this section

92-XX **BIOLOGY AND OTHER NATURAL SCIENCES**
92-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
92-01 Instructional exposition (textbooks, tutorial papers, etc.)
92-02 Research exposition (monographs, survey articles)
92-03 Historical (must also be assigned at least one classification number from Section 01)
92-04 Explicit machine computation and programs (not the theory of computation or programming)
92-06 Proceedings, conferences, collections, etc.
92-08 Computational methods
92Bxx **Mathematical biology in general**
92B05 General biology and biomathematics
92B10 Taxonomy, cladistics, statistics
92B15 General biostatistics [See also 62P10]
92B20 Neural networks, artificial life and related topics [See also 68T05, 82C32, 94Cxx]
92B25 Biological rhythms and synchronization
92B99 None of the above, but in this section

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92Cxx **Physiological, cellular and medical topics**
92C05 Biophysics
92C10 Biomechanics [See also 74L15]
92C15 Developmental biology, pattern formation
92C17 Cell movement (chemotaxis, etc.)
92C20 Neural biology
92C30 Physiology (general)
92C35 Physiological flow [See also 76Z05]
92C37 Cell biology
92C40 Biochemistry, molecular biology
92C42 Systems biology, networks
92C45 Kinetics in biochemical problems (pharmacokinetics, enzyme kinetics, etc.) [See also 80A30]
92C50 Medical applications (general)
92C55 Biomedical imaging and signal processing [See also 44A12, 65R10, 94A08, 94A12]
92C60 Medical epidemiology
92C80 Plant biology
92C99 None of the above, but in this section
92Dxx **Genetics and population dynamics**
92D10 Genetics {For genetic algebras, see 17D92}
92D15 Problems related to evolution
92D20 Protein sequences, DNA sequences
92D25 Population dynamics (general)
92D30 Epidemiology
92D40 Ecology
92D50 Animal behavior
92D99 None of the above, but in this section
92Exx **Chemistry {For biochemistry, see 92C40}**
92E10 Molecular structure (graph-theoretic methods, methods of differential topology, etc.)
92E20 Classical flows, reactions, etc. [See also 80A30, 80A32]
92E99 None of the above, but in this section
92Fxx **Other natural sciences (should also be assigned at least one other classification number in this section)**
92F05 Other natural sciences (should also be assigned at least one other classification number in section 92)
92F99 None of the above, but in this section

93-XX **SYSTEMS THEORY; CONTROL {For optimal control, see 49-XX}**
93-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
93-01 Instructional exposition (textbooks, tutorial papers, etc.)
93-02 Research exposition (monographs, survey articles)
93-03 Historical (must also be assigned at least one classification number from Section 01)
93-04 Explicit machine computation and programs (not the theory of computation or programming)
93-06 Proceedings, conferences, collections, etc.
93Axx **General**
93A05 Axiomatic system theory
93A10 General systems
93A13 Hierarchical systems
93A14 Decentralized systems
93A15 Large scale systems
93A30 Mathematical modeling (models of systems, model-matching, etc.)
93A99 None of the above, but in this section
93Bxx **Controllability, observability, and system structure**
93B03 Attainable sets
93B05 Controllability
93B07 Observability
93B10 Canonical structure
93B11 System structure simplification
93B12 Variable structure systems
93B15 Realizations from input-output data
93B17 Transformations
93B18 Linearizations
93B20 Minimal systems representations
93B25 Algebraic methods
93B27 Geometric methods
93B28 Operator-theoretic methods [See also 47A48, 47A57, 47B35, 47N70]
93B30 System identification
93B35 Sensitivity (robustness)
93B36 H^∞-control
93B40 Computational methods
93B50 Synthesis problems
93B51 Design techniques (robust design, computer-aided design, etc.)
93B52 Feedback control
93B55 Pole and zero placement problems
93B60 Eigenvalue problems
93B99 None of the above, but in this section

93Cxx **Control systems**
93C05 Linear systems
93C10 Nonlinear systems
93C15 Systems governed by ordinary differential equations [See also 34H05]
93C20 Systems governed by partial differential equations
93C23 Systems governed by functional-differential equations [See also 34K35]
93C25 Systems in abstract spaces
93C30 Systems governed by functional relations other than differential equations (such as hybrid and switching systems)
93C35 Multivariable systems
93C40 Adaptive control
93C41 Problems with incomplete information
93C42 Fuzzy control systems
93C55 Discrete-time systems
93C57 Sampled-data systems
93C62 Digital systems
93C65 Discrete event systems
93C70 Time-scale analysis and singular perturbations
93C73 Perturbations
93C80 Frequency-response methods
93C83 Control problems involving computers (process control, etc.)
93C85 Automated systems (robots, etc.) [See also 68T40, 70B15, 70Q05]
93C95 Applications
93C99 None of the above, but in this section
93Dxx **Stability**
93D05 Lyapunov and other classical stabilities (Lagrange, Poisson, L^p, l^p, etc.)
93D09 Robust stability
93D10 Popov-type stability of feedback systems
93D15 Stabilization of systems by feedback
93D20 Asymptotic stability
93D21 Adaptive or robust stabilization
93D25 Input-output approaches
93D30 Scalar and vector Lyapunov functions
93D99 None of the above, but in this section
93Exx **Stochastic systems and control**
93E03 Stochastic systems, general
93E10 Estimation and detection [See also 60G35]
93E11 Filtering [See also 60G35]
93E12 System identification
93E14 Data smoothing
93E15 Stochastic stability
93E20 Optimal stochastic control
93E24 Least squares and related methods
93E25 Other computational methods
93E35 Stochastic learning and adaptive control
93E99 None of the above, but in this section

94-XX **INFORMATION AND COMMUNICATION, CIRCUITS**
94-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
94-01 Instructional exposition (textbooks, tutorial papers, etc.)
94-02 Research exposition (monographs, survey articles)
94-03 Historical (must also be assigned at least one classification number from Section 01)
94-04 Explicit machine computation and programs (not the theory of computation or programming)
94-06 Proceedings, conferences, collections, etc.
94Axx **Communication, information**
94A05 Communication theory [See also 60G35, 90B18]
94A08 Image processing (compression, reconstruction, etc.) [See also 68U10]
94A11 Application of orthogonal and other special functions
94A12 Signal theory (characterization, reconstruction, filtering, etc.)
94A13 Detection theory
94A14 Modulation and demodulation
94A15 Information theory, general [See also 62B10, 81P45]
94A17 Measures of information, entropy
94A20 Sampling theory
94A24 Coding theorems (Shannon theory)
94A29 Source coding [See also 68P30]
94A34 Rate-distortion theory
94A40 Channel models (including quantum)
94A45 Prefix, length-variable, comma-free codes [See also 20M35, 68Q45]
94A50 Theory of questionnaires
94A55 Shift register sequences and sequences over finite alphabets
94A60 Cryptography [See also 11T71, 14G50, 68P25, 81P94]
94A62 Authentication and secret sharing [See also 81P94]
94A99 None of the above, but in this section

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94Bxx **Theory of error-correcting codes and error-detecting codes**
94B05 Linear codes, general
94B10 Convolutional codes
94B12 Combined modulation schemes (including trellis codes)
94B15 Cyclic codes
94B20 Burst-correcting codes
94B25 Combinatorial codes
94B27 Geometric methods (including applications of algebraic geometry) [See also 11T71, 14G50]
94B30 Majority codes
94B35 Decoding
94B40 Arithmetic codes [See also 11T71, 14G50]
94B50 Synchronization error-correcting codes
94B60 Other types of codes
94B65 Bounds on codes
94B70 Error probability
94B75 Applications of the theory of convex sets and geometry of numbers (covering radius, etc.) [See also 11H31, 11H71]
94B99 None of the above, but in this section
94Cxx **Circuits, networks**
94C05 Analytic circuit theory
94C10 Switching theory, application of Boolean algebra; Boolean functions [See also 06E30]
94C12 Fault detection; testing
94C15 Applications of graph theory [See also 05Cxx, 68R10]
94C30 Applications of design theory [See also 05Bxx]
94C99 None of the above, but in this section
94Dxx **Fuzzy sets and logic (in connection with questions of Section 94) [See also 03B52, 03E72, 28E10]**
94D05 Fuzzy sets and logic (in connection with questions of Section 94) [See also 03B52, 03E72, 28E10]
94D99 None of the above, but in this section
97-XX **MATHEMATICS EDUCATION**
97-00 General reference works (handbooks, dictionaries, bibliographies, etc.)
97-01 Instructional exposition (textbooks, tutorial papers, etc.)
97-02 Research exposition (monographs, survey articles)
97-03 Historical (must also be assigned at least one classification number from Section 01)
97-04 Explicit machine computation and programs (not the theory of computation or programming)
97-06 Proceedings, conferences, collections, etc.
97Axx **General, mathematics and education**
97A10 Comprehensive works, reference books
97A20 Recreational mathematics, games [See also 00A08]
97A30 History of mathematics and mathematics education [See also 01–XX]
97A40 Mathematics and society
97A50 Bibliographies [See also 01–00]
97A70 Theses and postdoctoral theses
97A80 Popularization of mathematics
97A99 None of the above, but in this section
97Bxx **Educational policy and systems**
97B10 Educational research and planning
97B20 General education
97B30 Vocational education
97B40 Higher education
97B50 Teacher education {For research aspects, see 97C70}
97B60 Adult and further education
97B70 Syllabuses, educational standards
97B99 None of the above, but in this section
97Cxx **Psychology of mathematics education, research in mathematics education**
97C10 Comprehensive works
97C20 Affective behavior
97C30 Cognitive processes, learning theories
97C40 Intelligence and aptitudes
97C50 Language and verbal communities
97C60 Sociological aspects of learning
97C70 Teaching-learning processes
97C99 None of the above, but in this section
97Dxx **Education and instruction in mathematics**
97D10 Comprehensive works, comparative studies
97D20 Philosophical and theoretical contributions (maths didactics)
97D30 Objectives and goals
97D40 Teaching methods and classroom techniques
97D50 Teaching problem solving and heuristic strategies {For research aspects, see 97Cxx}
97D60 Student assessment, achievement control and rating
97D70 Learning difficulties and student errors
97D80 Teaching units and draft lessons
97D99 None of the above, but in this section
97Exx **Foundations of mathematics**
97E10 Comprehensive works
97E20 Philosophy and mathematics
97E30 Logic
97E40 Language of mathematics
97E50 Reasoning and proving in the mathematics classroom
97E60 Sets, relations, set theory
97E99 None of the above, but in this section
97Fxx **Arithmetic, number theory**
97F10 Comprehensive works
97F20 Pre-numerical stage, concept of numbers
97F30 Natural numbers
97F40 Integers, rational numbers
97F50 Real numbers, complex numbers
97F60 Number theory
97F70 Measures and units
97F80 Ratio and proportion, percentages
97F90 Real life mathematics, practical arithmetic
97F99 None of the above, but in this section
97Gxx **Geometry**
97G10 Comprehensive works
97G20 Informal geometry
97G30 Areas and volumes
97G40 Plane and solid geometry
97G50 Transformation geometry
97G60 Plane and spherical trigonometry
97G70 Analytic geometry. Vector algebra
97G80 Descriptive geometry
97G99 None of the above, but in this section
97Hxx **Algebra**
97H10 Comprehensive works
97H20 Elementary algebra
97H30 Equations and inequalities
97H40 Groups, rings, fields
97H50 Ordered algebraic structures
97H60 Linear algebra
97H99 None of the above, but in this section
97Ixx **Analysis**
97I10 Comprehensive works
97I20 Mappings and functions
97I30 Sequences and series
97I40 Differential calculus
97I50 Integral calculus
97I60 Functions of several variables
97I70 Functional equations
97I80 Complex analysis
97I99 None of the above, but in this section
97Kxx **Combinatorics, graph theory, probability theory, statistics**
97K10 Comprehensive works
97K20 Combinatorics
97K30 Graph theory
97K40 Descriptive statistics
97K50 Probability theory
97K60 Distributions and stochastic processes
97K70 Foundations and methodology of statistics
97K80 Applied statistics
97K99 None of the above, but in this section
97Mxx **Mathematical modeling, applications of mathematics**
97M10 Modeling and interdisciplinarity
97M20 Mathematics in vocational training and career education
97M30 Financial and insurance mathematics
97M40 Operations research, economics
97M50 Physics, astronomy, technology, engineering
97M60 Biology, chemistry, medicine
97M70 Behavioral and social sciences
97M80 Arts, music, language, architecture
97M99 None of the above, but in this section
97Nxx **Numerical mathematics**
97N10 Comprehensive works
97N20 Rounding, estimation, theory of errors
97N30 Numerical algebra
97N40 Numerical analysis
97N50 Interpolation and approximation
97N60 Mathematical programming
97N70 Discrete mathematics
97N80 Mathematical software, computer programs
97N99 None of the above, but in this section

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97Pxx **Computer science**
97P10 Comprehensive works
97P20 Theory of computer science
97P30 System software
97P40 Programming languages
97P50 Programming techniques
97P60 Hardware
97P70 Computer science and society
97P99 None of the above, but in this section
97Qxx **Computer science education**
97Q10 Comprehensive works
97Q20 Affective aspects in teaching computer science
97Q30 Cognitive processes
97Q40 Sociological aspects
97Q50 Objectives
97Q60 Teaching methods and classroom techniques
97Q70 Student assessment
97Q80 Teaching units
97Q99 None of the above, but in this section
97Rxx **Computer science applications**
97R10 Comprehensive works, collections of programs
97R20 Applications in mathematics
97R30 Applications in sciences
97R40 Artificial intelligence
97R50 Data bases, information systems
97R60 Computer graphics
97R70 User programs, administrative applications
97R80 Recreational computing
97R99 None of the above, but in this section
97Uxx **Educational material and media, educational technology**
97U10 Comprehensive works
97U20 Textbooks. Textbook research
97U30 Teachers' manuals and planning aids
97U40 Problem books. Competitions. Examinations
97U50 Computer assisted instruction; e-learning
97U60 Manipulative materials
97U70 Technological tools, calculators
97U80 Audiovisual media
97U99 None of the above, but in this section