

Handbook Of Discrete And Combinatorial Mathematics Second Edition Discrete Mathematics And Its Applications

The fusion between graph theory and combinatorial optimization has led to theoretically profound and practically useful algorithms, yet there is no book that currently covers both areas together. Handbook of Graph Theory, Combinatorial Optimization, and Algorithms is the first to present a unified, comprehensive treatment of both graph theory and combinatorial optimization. Analysis of Algorithms of Nonuniformity is a solid presentation about the analysis of algorithms, and the data structures that support them. Traditionally, algorithms have been approached either via a probabilistic view or an analytic approach. The authors adopt both approaches and bring them together to get the best of both worlds and benefit from the advantage of each approach. The text examines algorithms that are designed to handle general data—sort any array, find the median of any numerical set, and identify patterns in any setting. At the same time, it evaluates "average" performance, "typical" behavior, or in mathematical terms, the expectations of the random variables that describe their operations. Many exercises are presented, which are essential since they convey additional material complementing the content of the chapters. For this reason, the solutions are more than mere answers, but explain and expand upon related concepts, and motivate further work by the reader. Highlights: A unique book that merges probability with analysis of algorithms Approaches analysis of algorithms from the angle of uniformity Non-uniformity makes more realistic models of real-life scenarios possible Results can be applied to many applications Includes many exercises of various levels of difficulty About the Authors: Micha Hofri is a Professor of Computer Science, and former department head at Worcester Polytechnic Institute. He holds a Ph.D. of Industrial Engineering (1972), all from Technion, the Israel Institute of Technology. He has 39 publications in Mathematics. Hosam Mahmoud is a Professor at, the Department of Statistics at George Washington University in Washington D.C., where he used to be the former chair. He holds an Ph.D. in Computer Science from Ohio State University. He is on the editorial board of five academic journals.

Handbook of Discrete and Combinatorial Mathematics provides a comprehensive reference volume for mathematicians, computer scientists, engineers, as well as students and reference librarians. The material is presented so that key information can be located and used quickly and easily. Each chapter includes a glossary. Individual topics are covered in sections and subsections within chapters, each of which is organized into clearly identifiable parts: definitions, facts, and examples. Examples are provided to illustrate some of the key definitions, facts, and algorithms. Some curious and entertaining facts and puzzles are also included. Readers will also find an extensive collection of biographies. This second edition is a major revision. It includes extensive additions and updates. Since the first edition appeared in 1999, many new discoveries have been made and new areas have grown in importance, which are covered in this edition.

This fifth edition continues to improve on the features that have made it the market leader. The text offers a flexible organization, enabling instructors to adapt the book to their particular courses. The book is both complete and careful, and it continues to maintain its emphasis on algorithms and applications. Excellent exercise sets allow students to perfect skills as they practice. This new edition continues to feature numerous computer science applications-making this the ideal text for preparing students for advanced study. This volume brings together a diverse range of scholars to address important philosophical and interdisciplinary questions in the study of language. Linguistics throughout history has been a conduit to the study of the mind, brain, societal structure, literature and history itself. The epistemic and methodological transfer between the sciences and humanities in regards to linguistics has often been documented, but the underlying philosophical issues have not always been adequately addressed. With 15 original and interdisciplinary chapters, this volume therefore tackles vital questions relating to the philosophy, history, and theoretical interplay between the study of language and fields as varied as logic, physics, biology, classical philology and neuroscience. With a four part structure, questions of the mathematical foundations of linguistics, links to the natural sciences, cognitive implications and historical connections, take centre stage throughout the volume. The final chapters present research related to the linguistic connections between history, philosophy and the humanities more broadly. Advancing new avenues of research, this volume is exemplary in its treatment of diachronic and cross-disciplinary interaction, and will be of interest to all scholars interested in the study of language.

This book constitutes the thoroughly refereed post-workshop proceedings of the 14th International Workshop on Approximation and Online Algorithms, WAOA 2016, held in Aarhus, Denmark, in August 2016 as part of ALGO 2016. The 16 revised full papers presented together with 2 invited lectures were carefully reviewed and selected from 33 submissions. Topics of interest for WAOA 2016 were: coloring and partitioning, competitive analysis, network design, packing and covering, paradigms for design and analysis of approximation and online algorithms, randomization techniques, real world applications, and scheduling problems.

With most services and products now being offered through digital communications, new challenges have emerged for information security specialists. A Multidisciplinary Introduction to Information Security presents a range of topics on the security, privacy, and safety of information and communication technology. It brings together methods in pure mathematics, computer and telecommunication sciences, and social sciences. The book begins with the cryptographic algorithms of the Advanced Encryption Standard (AES) and Rivest, Shamir, and Adleman (RSA). It explains the mathematical reasoning behind public key cryptography and the properties of a cryptographic hash function before presenting the principles and examples of quantum cryptography. The text also describes the use of cryptographic primitives in the communication process, explains how a public key infrastructure can mitigate the problem of crypto-key distribution, and discusses the security problems of wireless network access. After examining past and present protection mechanisms in the global mobile telecommunication system, the book proposes a software engineering practice that prevents attacks and misuse of software. It then

presents an evaluation method for ensuring security requirements of products and systems, covers methods and tools of digital forensics and computational forensics, and describes risk assessment as part of the larger activity of risk management. The final chapter focuses on information security from an organizational and people point of view. As our ways of communicating and doing business continue to shift, information security professionals must find answers to evolving issues. Offering a starting point for more advanced work in the field, this volume addresses various security and privacy problems and solutions related to the latest information and communication technology.

A Unified Account of Permutations in Modern Combinatorics A 2006 CHOICE Outstanding Academic Title, the first edition of this bestseller was lauded for its detailed yet engaging treatment of permutations. Providing more than enough material for a one-semester course, Combinatorics of Permutations, Second Edition continues to clearly show the usefulness

Handbook of Medical Image Computing and Computer Assisted Intervention presents important advanced methods and state-of-the-art research in medical image computing and computer assisted intervention, providing a comprehensive reference on current technical approaches and solutions, while also offering proven algorithms for a variety of essential medical imaging applications. This book is written primarily for university researchers, graduate students and professional practitioners (assuming an elementary level of linear algebra, probability and statistics, and signal processing) working on medical image computing and computer assisted intervention. Presents the key research challenges in medical image computing and computer-assisted intervention Written by leading authorities of the Medical Image Computing and Computer Assisted Intervention (MICCAI) Society Contains state-of-the-art technical approaches to key challenges Demonstrates proven algorithms for a whole range of essential medical imaging applications Includes source codes for use in a plug-and-play manner Embraces future directions in the fields of medical image computing and computer-assisted intervention

Presenting the state of the art, the Handbook of Enumerative Combinatorics brings together the work of today's most prominent researchers. The contributors survey the methods of combinatorial enumeration along with the most frequent applications of these methods. This important new work is edited by Miklós Bóna of the University of Florida where he is a member of the Academy of Distinguished Teaching Scholars. He received his Ph.D. in mathematics at Massachusetts Institute of Technology in 1997. Miklós is the author of four books and more than 65 research articles, including the award-winning Combinatorics of Permutations. Miklós Bóna is an editor-in-chief for the Electronic Journal of Combinatorics and Series Editor of the Discrete Mathematics and Its Applications Series for CRC Press/Chapman and Hall. The first two chapters provide a comprehensive overview of the most frequently used methods in combinatorial enumeration, including algebraic, geometric, and analytic methods. These chapters survey generating functions, methods from linear algebra, partially ordered sets, polytopes, hyperplane arrangements, and matroids. Subsequent chapters illustrate applications of these methods for counting a wide array of objects. The contributors for this book represent an international spectrum of researchers with strong histories of results. The chapters are organized so readers advance from the more general ones, namely enumeration methods, towards the more specialized ones. Topics include coverage of asymptotic normality in enumeration, planar maps, graph enumeration, Young tableaux, unimodality, log-concavity, real zeros, asymptotic normality, trees, generalized Catalan paths, computerized enumeration schemes, enumeration of various graph classes, words, tilings, pattern avoidance, computer algebra, and parking functions. This book will be beneficial to a wide audience. It will appeal to experts on the topic interested in learning more about the finer points, readers interested in a systematic and organized treatment of the topic, and novices who are new to the field.

Representation Theory of Symmetric Groups is the most up-to-date abstract algebra book on the subject of symmetric groups and representation theory. Utilizing new research and results, this book can be studied from a combinatorial, algorithmic or algebraic viewpoint. This book is an excellent way of introducing today's students to representation theory of the symmetric groups, namely classical theory. From there, the book explains how the theory can be extended to other related combinatorial algebras like the Iwahori-Hecke algebra. In a clear and concise manner, the author presents the case that most calculations on symmetric group can be performed by utilizing appropriate algebras of functions. Thus, the book explains how some Hopf algebras (symmetric functions and generalizations) can be used to encode most of the combinatorial properties of the representations of symmetric groups. Overall, the book is an innovative introduction to representation theory of symmetric groups for graduate students and researchers seeking new ways of thought.

Computational Geometry is an area that provides solutions to geometric problems which arise in applications including Geographic Information Systems, Robotics and Computer Graphics. This Handbook provides an overview of key concepts and results in Computational Geometry. It may serve as a reference and study guide to the field. Not only the most advanced methods or solutions are described, but also many alternate ways of looking at problems and how to solve them.

Polyhedral and Algebraic Methods in Computational Geometry provides a thorough introduction into algorithmic geometry and its applications. It presents its primary topics from the viewpoints of discrete, convex and elementary algebraic geometry. The first part of the book studies classical problems and techniques that refer to polyhedral structures. The authors include a study on algorithms for computing convex hulls as well as the construction of Voronoi diagrams and Delone triangulations. The second part of the book develops the primary concepts of (non-linear) computational algebraic geometry. Here, the book looks at Gröbner bases and solving systems of polynomial equations. The theory is illustrated by applications in computer graphics, curve reconstruction and robotics. Throughout the book, interconnections between computational geometry and other disciplines (such as algebraic geometry, optimization and numerical mathematics) are established. Polyhedral and Algebraic Methods in Computational Geometry is directed towards advanced undergraduates in mathematics and computer science, as well as towards engineering students who are interested in the applications of computational geometry.

Combinatorics and Number Theory of Counting Sequences is an introduction to the theory of finite set partitions and to the enumeration of cycle decompositions of permutations. The presentation prioritizes elementary enumerative proofs. Therefore, parts of the book are designed so that even those high school students and teachers who are interested in combinatorics can have the benefit of them. Still, the book collects vast, up-to-date information for many counting sequences (especially, related to set partitions and permutations), so it is a must-have piece for those mathematicians who do research on enumerative combinatorics. In addition, the book contains number theoretical results on counting sequences of set partitions and permutations,

so number theorists who would like to see nice applications of their area of interest in combinatorics will enjoy the book, too. Features The Outlook sections at the end of each chapter guide the reader towards topics not covered in the book, and many of the Outlook items point towards new research problems. An extensive bibliography and tables at the end make the book usable as a standard reference. Citations to results which were scattered in the literature now become easy, because huge parts of the book (especially in parts II and III) appear in book form for the first time.

This is a book guaranteed to delight the reader. It not only depicts the state of mathematics at the end of the century, but is also full of remarkable insights into its future development as we enter a new millennium. True to its title, the book extends beyond the spectrum of mathematics to include contributions from other related sciences. You will enjoy reading the many stimulating contributions and gain insights into the astounding progress of mathematics and the perspectives for its future. One of the editors, Björn Engquist, is a world-renowned researcher in computational science and engineering. The second editor, Wilfried Schmid, is a distinguished mathematician at Harvard University. Likewise the authors are all foremost mathematicians and scientists, and their biographies and photographs appear at the end of the book. Unique in both form and content, this is a "must-read" for every mathematician and scientist and, in particular, for graduates still choosing their specialty. Limited collector's edition - an exclusive and timeless work. This special, numbered edition will be available until June 1, 2000. Firm orders only.

Combinatorial (or discrete) optimization is one of the most active fields in the interface of operations research, computer science, and applied mathematics. Combinatorial optimization problems arise in various applications, including communications network design, VLSI design, machine vision, air line crew scheduling, corporate planning, computer-aided design and manufacturing, database query design, cellular telephone frequency assignment, constraint directed reasoning, and computational biology. Furthermore, combinatorial optimization problems occur in many diverse areas such as linear and integer programming, graph theory, artificial intelligence, and number theory. All these problems, when formulated mathematically as the minimization or maximization of a certain function defined on some domain, have a commonality of discreteness. Historically, combinatorial optimization starts with linear programming. Linear programming has an entire range of important applications including production planning and distribution, personnel assignment, finance, allocation of economic resources, circuit simulation, and control systems. Leonid Kantorovich and Tjalling Koopmans received the Nobel Prize (1975) for their work on the optimal allocation of resources. Two important discoveries, the ellipsoid method (1979) and interior point approaches (1984) both provide polynomial time algorithms for linear programming. These algorithms have had a profound effect in combinatorial optimization. Many polynomial-time solvable combinatorial optimization problems are special cases of linear programming (e.g. matching and maximum flow). In addition, linear programming relaxations are often the basis for many approximation algorithms for solving NP-hard problems (e.g. dual heuristics)."

This textbook thoroughly outlines combinatorial algorithms for generation, enumeration, and search. Topics include backtracking and heuristic search methods applied to various combinatorial structures, such as: Combinations Permutations Graphs Designs Many classical areas are covered as well as new research topics not included in most existing texts, such as: Group algorithms Graph isomorphism Hill-climbing Heuristic search algorithms This work serves as an exceptional textbook for a modern course in combinatorial algorithms, providing a unified and focused collection of recent topics of interest in the area. The authors, synthesizing material that can only be found scattered through many different sources, introduce the most important combinatorial algorithmic techniques - thus creating an accessible, comprehensive text that students of mathematics, electrical engineering, and computer science can understand without needing a prior course on combinatorics.

This is a supplementary volume to the major three-volume Handbook of Combinatorial Optimization set. It can also be regarded as a stand-alone volume presenting chapters dealing with various aspects of the subject in a self-contained way.

Discrete geometry is a relatively new development in pure mathematics, while computational geometry is an emerging area in applications-driven computer science. Their intermingling has yielded exciting advances in recent years, yet what has been lacking until now is an undergraduate textbook that bridges the gap between the two. Discrete and Computational Geometry offers a comprehensive yet accessible introduction to this cutting-edge frontier of mathematics and computer science. This book covers traditional topics such as convex hulls, triangulations, and Voronoi diagrams, as well as more recent subjects like pseudotriangulations, curve reconstruction, and locked chains. It also touches on more advanced material, including Dehn invariants, associahedra, quasigeodesics, Morse theory, and the recent resolution of the Poincaré conjecture. Connections to real-world applications are made throughout, and algorithms are presented independently of any programming language. This richly illustrated textbook also features numerous exercises and unsolved problems. The essential introduction to discrete and computational geometry Covers traditional topics as well as new and advanced material Features numerous full-color illustrations, exercises, and unsolved problems Suitable for sophomores in mathematics, computer science, engineering, or physics Rigorous but accessible An online solutions manual is available (for teachers only). To obtain access, please e-mail:

Vickie_Kearn@press.princeton.edu

The third edition of this handbook is designed to provide a broad coverage of the concepts, implementations, and applications in metaheuristics. The book's chapters serve as stand-alone presentations giving both the necessary underpinnings as well as practical guides for implementation. The nature of metaheuristics invites an analyst to modify basic methods in response to problem characteristics, past experiences, and personal preferences, and the chapters in this handbook are designed to facilitate this process as well. This new edition has been fully revised and features new chapters on swarm intelligence and automated design of metaheuristics from flexible algorithm frameworks. The authors who have contributed to this volume represent leading figures from the metaheuristic community and are responsible for pioneering contributions to the fields they write about. Their collective work has significantly enriched the field of optimization in general and combinatorial optimization in particular. Metaheuristics are solution methods that orchestrate an interaction between local improvement procedures and higher level strategies to create a process capable of escaping from local optima and performing a robust search of a solution space. In addition, many new and exciting developments and extensions have been observed in the last few years. Hybrids of metaheuristics with other optimization techniques, like branch-and-bound, mathematical programming or constraint programming are also

increasingly popular. On the front of applications, metaheuristics are now used to find high-quality solutions to an ever-growing number of complex, ill-defined real-world problems, in particular combinatorial ones. This handbook should continue to be a great reference for researchers, graduate students, as well as practitioners interested in metaheuristics.

While high-quality books and journals in this field continue to proliferate, none has yet come close to matching the Handbook of Discrete and Computational Geometry, which in its first edition, quickly became the definitive reference work in its field. But with the rapid growth of the discipline and the many advances made over the past seven years, it's time to bring this standard-setting reference up to date. Editors Jacob E. Goodman and Joseph O'Rourke reassembled their stellar panel of contributors, added many more, and together thoroughly revised their work to make the most important results and methods, both classic and cutting-edge, accessible in one convenient volume. Now over more than 1500 pages, the Handbook of Discrete and Computational Geometry, Second Edition once again provides unparalleled, authoritative coverage of theory, methods, and applications. Highlights of the Second Edition: Thirteen new chapters: Five on applications and others on collision detection, nearest neighbors in high-dimensional spaces, curve and surface reconstruction, embeddings of finite metric spaces, polygonal linkages, the discrepancy method, and geometric graph theory Thorough revisions of all remaining chapters Extended coverage of computational geometry software, now comprising two chapters: one on the LEDA and CGAL libraries, the other on additional software Two indices: An Index of Defined Terms and an Index of Cited Authors Greatly expanded bibliographies The Handbook of Discrete and Computational Geometry is intended as a reference book fully accessible to nonspecialists as well as specialists, covering all major aspects of both fields. The book offers the most important results and methods in discrete and computational geometry to those who use them in their work, both in the academic world—as researchers in mathematics and computer science—and in the professional world—as practitioners in fields as diverse as operations research, molecular biology, and robotics. Discrete geometry has contributed significantly to the growth of discrete mathematics in recent years. This has been fueled partly by the advent of powerful computers and by the recent explosion of activity in the relatively young field of computational geometry. This synthesis between discrete and computational geometry lies at the heart of this Handbook. A growing list of application fields includes combinatorial optimization, computer-aided design, computer graphics, crystallography, data analysis, error-correcting codes, geographic information systems, motion planning, operations research, pattern recognition, robotics, solid modeling, and tomography.

Winner of an Outstanding Academic Title Award from CHOICE Magazine Most available cryptology books primarily focus on either mathematics or history. Breaking this mold, *Secret History: The Story of Cryptology* gives a thorough yet accessible treatment of both the mathematics and history of cryptology. Requiring minimal mathematical prerequisites, the book presents the mathematics in sufficient detail and weaves the history throughout the chapters. In addition to the fascinating historical and political sides of cryptology, the author—a former Scholar-in-Residence at the U.S. National Security Agency (NSA) Center for Cryptologic History—includes interesting instances of codes and ciphers in crime, literature, music, and art. Following a mainly chronological development of concepts, the book focuses on classical cryptology in the first part. It covers Greek and Viking cryptography, the Vigenère cipher, the one-time pad, transposition ciphers, Jefferson's cipher wheel, the Playfair cipher, ADFGX, matrix encryption, World War II cipher systems (including a detailed examination of Enigma), and many other classical methods introduced before World War II. The second part of the book examines modern cryptology. The author looks at the work of Claude Shannon and the origin and current status of the NSA, including some of its Suite B algorithms such as elliptic curve cryptography and the Advanced Encryption Standard. He also details the controversy that surrounded the Data Encryption Standard and the early years of public key cryptography. The book not only provides the how-to of the Diffie-Hellman key exchange and RSA algorithm, but also covers many attacks on the latter. Additionally, it discusses ElGamal, digital signatures, PGP, and stream ciphers and explores future directions such as quantum cryptography and DNA computing. With numerous real-world examples and extensive references, this book skillfully balances the historical aspects of cryptology with its mathematical details. It provides readers with a sound foundation in this dynamic field.

Easily Accessible to Students with Nontechnical Backgrounds In a clear, nontechnical manner, *Cryptology: Classical and Modern with Maplelets* explains how fundamental mathematical concepts are the bases of cryptographic algorithms. Designed for students with no background in college-level mathematics, the book assumes minimal mathematical prerequisites and incorporates student-friendly Maplelets throughout that provide practical examples of the techniques used. Technology Resource By using the Maplelets, students can complete complicated tasks with relative ease. They can encrypt, decrypt, and cryptanalyze messages without the burden of understanding programming or computer syntax. The authors explain topics in detail first before introducing one or more Maplelets. All Maplelet material and exercises are given in separate, clearly labeled sections. Instructors can omit the Maplelet sections without any loss of continuity and non-Maplet examples and exercises can be completed with, at most, a simple hand-held calculator. The Maplelets are available for download at www.radford.edu/~npsigmon/cryptobook.html. A Gentle, Hands-On Introduction to Cryptology After introducing elementary methods and techniques, the text fully develops the Enigma cipher machine and Navajo code used during World War II, both of which are rarely found in cryptology textbooks. The authors then demonstrate mathematics in cryptology through monoalphabetic, polyalphabetic, and block ciphers. With a focus on public-key cryptography, the book describes RSA ciphers, the Diffie-Hellman key exchange, and ElGamal ciphers. It also explores current U.S. federal cryptographic standards, such as the AES, and explains how to authenticate messages via digital signatures, hash functions, and certificates.

This 2005 book deals with interest topics in Discrete and Algorithmic aspects of Geometry.

Handbook of Discrete and Combinatorial Mathematics CRC Press

Graph Searching Games and Probabilistic Methods is the first book that focuses on the intersection of graph searching games and probabilistic methods. The book explores various applications of these powerful mathematical tools to games and processes such as Cops and Robbers, Zombie and Survivors, and Firefighting. Written in an engaging style, the book is accessible to a wide audience including mathematicians and computer scientists. Readers will find that the book provides state-of-the-art results, techniques, and directions in graph searching games, especially from the point of view of probabilistic methods.

With a substantial amount of new material, the Handbook of Linear Algebra, Second Edition provides comprehensive coverage of linear algebra concepts, applications, and computational

software packages in an easy-to-use format. It guides you from the very elementary aspects of the subject to the frontiers of current research. Along with revisions and updates throughout, the second edition of this bestseller includes 20 new chapters. New to the Second Edition Separate chapters on Schur complements, additional types of canonical forms, tensors, matrix polynomials, matrix equations, special types of matrices, generalized inverses, matrices over finite fields, invariant subspaces, representations of quivers, and spectral sets New chapters on combinatorial matrix theory topics, such as tournaments, the minimum rank problem, and spectral graph theory, as well as numerical linear algebra topics, including algorithms for structured matrix computations, stability of structured matrix computations, and nonlinear eigenvalue problems More chapters on applications of linear algebra, including epidemiology and quantum error correction New chapter on using the free and open source software system Sage for linear algebra Additional sections in the chapters on sign pattern matrices and applications to geometry Conjectures and open problems in most chapters on advanced topics Highly praised as a valuable resource for anyone who uses linear algebra, the first edition covered virtually all aspects of linear algebra and its applications. This edition continues to encompass the fundamentals of linear algebra, combinatorial and numerical linear algebra, and applications of linear algebra to various disciplines while also covering up-to-date software packages for linear algebra computations.

This book constitutes the refereed proceedings of the 20th International Conference on Theory and Applications of Satisfiability Testing, SAT 2017, held in Melbourne, Australia, in August/September 2017. The 22 revised full papers, 5 short papers, and 3 tool papers were carefully reviewed and selected from 64 submissions. The papers are organized in the following topical sections: algorithms, complexity, and lower bounds; clause learning and symmetry handling; maximum satisfiability and minimal correction sets; parallel SAT solving; quantified Boolean formulas; satisfiability modulo theories; and SAT encodings.

The importance of discrete and combinatorial mathematics continues to increase as the range of applications to computer science, electrical engineering, and the biological sciences grows dramatically. Providing a ready reference for practitioners in the field, the Handbook of Discrete and Combinatorial Mathematics, Second Edition presents additional material on Google's matrix, random graphs, geometric graphs, computational topology, and other key topics. New chapters highlight essential background information on bioinformatics and computational geometry. Each chapter includes a glossary, definitions, facts, examples, algorithms, major applications, and references.

This book constitutes the thoroughly refereed post-proceedings of the Indonesia-Japan Joint Conference on Combinatorial Geometry and Graph Theory, IJCCGGT 2003, held in Bandung, Indonesia in September 2003. The 23 revised papers presented were carefully selected during two rounds of reviewing and improvement. Among the topics covered are coverings, convex polygons, convex polyhedra, matchings, graph colourings, crossing numbers, subdivision numbers, combinatorial optimization, combinatorics, spanning trees, various graph characteristics, convex bodies, labelling, Ramsey number estimation, etc.

Crossing Numbers of Graphs is the first book devoted to the crossing number, an increasingly popular object of study with surprising connections. The field has matured into a large body of work, which includes identifiable core results and techniques. The book presents a wide variety of ideas and techniques in topological graph theory, discrete geometry, and computer science. The first part of the text deals with traditional crossing number, crossing number values, crossing lemma, related parameters, computational complexity, and algorithms. The second part includes the rich history of alternative crossing numbers, the rectilinear crossing number, the pair crossing number, and the independent odd crossing number. It also includes applications of the crossing number outside topological graph theory. Aimed at graduate students and professionals in both mathematics and computer science The first book of its kind devoted to the topic Authored by a noted authority in crossing numbers

Combinatorial Methods with Computer Applications provides in-depth coverage of recurrences, generating functions, partitions, and permutations, along with some of the most interesting graph and network topics, design constructions, and finite geometries. Requiring only a foundation in discrete mathematics, it can serve as the textbook in a combinat

Although its roots lie in information theory, the applications of coding theory now extend to statistics, cryptography, and many areas of pure mathematics, as well as pervading large parts of theoretical computer science, from universal hashing to numerical integration. Introduction to Coding Theory introduces the theory of error-correcting codes in a thorough but gentle presentation. Part I begins with basic concepts, then builds from binary linear codes and Reed-Solomon codes to universal hashing, asymptotic results, and 3-dimensional codes. Part II emphasizes cyclic codes, applications, and the geometric description of codes. The author takes a unique, more natural approach to cyclic codes that is not couched in ring theory but by virtue of its simplicity, leads to far-reaching generalizations. Throughout the book, his discussions are packed with applications that include, but reach well beyond, data transmission, with each one introduced as soon as the codes are developed. Although designed as an undergraduate text with myriad exercises, lists of key topics, and chapter summaries, Introduction to Coding Theory explores enough advanced topics to hold equal value as a graduate text and professional reference. Mastering the contents of this book brings a complete understanding of the theory of cyclic codes, including their various applications and the Euclidean algorithm decoding of BCH-codes, and carries readers to the level of the most recent research.

Developed from the author's popular graduate-level course, Computational Number Theory presents a complete treatment of number-theoretic algorithms. Avoiding advanced algebra, this self-contained text is designed for advanced undergraduate and beginning graduate students in engineering. It is also suitable for researchers new to the field and pract

From the Rosetta Stone to public-key cryptography, the art and science of cryptology has been used to unlock the vivid history of ancient cultures, to turn the tide of warfare, and to thwart potential hackers from attacking computer systems. Codes: The Guide to Secrecy from Ancient to Modern Times explores the depth and breadth of the field, remain

This book covers both theoretical and practical results for graph polynomials. Graph polynomials have been developed for measuring combinatorial graph invariants and for characterizing graphs. Various problems in pure and applied graph theory or discrete mathematics can be treated and solved efficiently by using graph polynomials. Graph polynomials have been proven useful areas such as discrete mathematics, engineering, information sciences, mathematical chemistry and related disciplines.

As effective organizational decision making is a major factor in a company's success, a comprehensive account of current available research on the core concepts of the decision support agenda is in high demand by academicians and professionals. Through 110 authoritative contributions by over 160 of the world's leading experts the Encyclopedia of Decision Making and

Decision Support Technologies presents a critical mass of research on the most up-to-date research on human and computer support of managerial decision making, including discussion on support of operational, tactical, and strategic decisions, human vs. computer system support structure, individual and group decision making, and multi-criteria decision making. Continuing in the bestselling, informative tradition of the first edition, the Handbook of Combinatorial Designs, Second Edition remains the only resource to contain all of the most important results and tables in the field of combinatorial design. This handbook covers the constructions, properties, and applications of designs as well as existence results. Over 30% longer than the first edition, the book builds upon the groundwork of its predecessor while retaining the original contributors' expertise. The first part contains a brief introduction and history of the subject. The following parts focus on four main classes of combinatorial designs: balanced incomplete block designs, orthogonal arrays and Latin squares, pairwise balanced designs, and Hadamard and orthogonal designs. Closely connected to the preceding sections, the next part surveys 65 additional classes of designs, such as balanced ternary, factorial, graphical, Howell, quasi-symmetric, and spherical. The final part presents mathematical and computational background related to design theory. New to the Second Edition An introductory part that provides a general overview and a historical perspective of the area New chapters on the history of design theory, various codes, bent functions, and numerous types of designs Fully updated tables, including BIBDs, MOLS, PBDs, and Hadamard matrices Nearly 2,200 references in a single bibliographic section Meeting the need for up-to-date and accessible tabular and reference information, this handbook provides the tools to understand combinatorial design theory and applications that span the entire discipline. The author maintains a website with more information.

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