Douglas Stinson Cryptography Theory And Practice 2nd Edition Chapman Amp Hall Crc

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Applied Algebra - Darel W. Hardy 2011-08-10
Using mathematical tools from number theory and finite fields, Applied Algebra: Codes, Ciphers, and Discrete Algorithms, Second Edition presents practical methods for solving problems in data security and data integrity. It is designed for an applied algebra course for students who have had prior classes in abstract or linear algebra. While the content has been reworked and improved, this edition continues to cover many algorithms that arise in cryptography and error-control codes. New to the Second Edition A CD-ROM containing an interactive version of the book that is powered by Scientific Notebook®, a mathematical word processor and easy-to-use computer algebra system New appendix that reviews prerequisite topics in algebra and number theory Double the number of exercises Instead of a general study on finite groups, the book considers finite groups of permutations and develops just enough of the theory of finite fields to facilitate construction of the fields used for error-control codes and the Advanced Encryption Standard. It also deals with integers and polynomials. Explaining the mathematics as needed, this text thoroughly explores how mathematical techniques can be used to solve practical problems. About the Authors Darel W. Hardy is Professor Emeritus in the Department of Mathematics at Colorado State University. His research interests include applied algebra and semigroups. Fred Richman is a professor in the Department of Mathematical Sciences at Florida Atlantic University. His research interests include Abelian group theory and constructive mathematics. Carol L. Walker is Associate Dean Emeritus in the Department of Mathematical Sciences at New Mexico State University. Her research interests include Abelian group theory, applications of homological algebra and category theory, and the mathematics of fuzzy sets and fuzzy logic.
Software Security - Theories and Systems - Kokichi Futatsugi 2004-11-02
Following the success of the International Symposium on Software Security 2002 (ISSS 2002), held in Keio University, Tokyo, November, 2002, ISSS 2003 was held in the Tokyo Institute of Technology, Tokyo, on November 4–6, 2003. This volume is the collection of the papers that were presented at ISSS 2003. The proceedings of ISSS 2002 was published as LNCS 2609. Although the security and reliability of software systems for networked c- puter systems are major concerns of current society, the technology for software securitystillneedstobedevelopedinmanydirections.SimilartoISSS2002,ISSS 2003 aimed to provide a forum for research discussions and exchanges

among world-leading scientists in the ?elds of both theoretical and systems aspects of security in software construction. The program of ISSS 2003 was a combination of invited talks and selected research contributions. It included the most recent visions and researches of the 9invitedspeakers,aswellas11contributionsofresearchesfundedbytheMEXT grant-in-aid for scienti?c research on the priority area “Implementation Scheme for Secure Computing” (AnZenKaken). We collected the original contributions after their presentation at the symposium and began a review procedure that resulted in the selection of the papers in this volume. They appear here in ?nal form. ISSS 2003 required a lot of work that was heavily dependent on members of the program committee, and sta?s and graduate students who participated in AnZenKaken. We sincerely thank them for their e?orts and time.

Mathematical Ciphers - Anne L. Young 2006

A cipher is a scheme for creating coded messages for the secure exchange of information. Throughout history, many different coding schemes have been devised. One of the oldest and simplest mathematical systems was used by Julius Caesar. This is where Mathematical Ciphers begins. Building on that simple system, Young moves on to more complicated schemes, ultimately ending with the RSA cipher, which is used to provide security for the internet. This book is structured differently from most mathematics texts. It does not begin with a mathematical topic, but rather with a cipher. The mathematics is developed as it is needed; the applications motivate the mathematics. As is typical in mathematics textbooks, most chapters end with exercises. Many of these problems are similar to solved examples and are designed to assist the reader in mastering the basic material. A few of the exercises are one-of-a-kind, intended to challenge the interested reader. Implementing encryption schemes is considerably easier with the use of the computer. For all the ciphers introduced in this book, JavaScript programs are available from the web. In addition to developing various encryption schemes, this book also introduces the reader to number theory. Here, the study of integers and their properties is placed in the exciting and modern context of cryptology. Mathematical Ciphers can be used as a textbook for an introductory course in mathematics for all majors. The only prerequisite is high school mathematics.

Handbook of Mathematical Induction - David S. Gunderson 2014-01-09

Handbook of Mathematical Induction: Theory and Applications shows how to find and write proofs via mathematical induction. This comprehensive book covers the theory, the structure of the written proof, all standard exercises, and hundreds of application examples from nearly every area of mathematics.In the first part of the book, the author discuss

Modern Cryptography - Wenbo Mao 2003-07-25

Leading HP security expert Wenbo Mao explains why "textbook" crypto schemes, protocols, and systems are profoundly vulnerable by revealing real-world-scenario attacks. Next, he shows how to realize cryptographic systems and protocols that are truly "fit for application"--and formally demonstrates their fitness. Mao presents practical examples throughout and provides all the mathematical background you'll need. Coverage includes: Crypto foundations: probability, information theory, computational complexity, number theory, algebraic techniques, and more Authentication: basic techniques and principles vs. misconceptions and consequential attacks Evaluating real-world protocol standards including IPSec, IKE, SSH, TLS (SSL), and Kerberos Designing stronger counterparts to vulnerable "textbook" crypto schemes Mao introduces formal and reductionist methodologies to prove the "fit-for-application" security of practical encryption, signature, signcryption, and authentication schemes. He gives detailed explanations for zero-knowledge protocols: definition, zero-knowledge properties, equatability vs. simulatability, argument vs. proof, round-efficiency, and non-interactive versions.

A Cryptography Primer - Philip N. Klein 2014-03-17

This accessible introduction for undergraduates explains the cryptographic protocols for privacy and the use of digital signatures for certifying the integrity of messages and programs. It provides a guide to the principles and elementary mathematics underlying modern cryptography, giving readers a look under the hood for security

techniques and the reasons they are thought to be secure.

A Classical Introduction to Cryptography - Serge Vaudenay 2006-01-20

A Classical Introduction to Cryptography: Applications for Communications Security introduces fundamentals of information and communication security by providing appropriate mathematical concepts to prove or break the security of cryptographic schemes. This advanced-level textbook covers conventional cryptographic primitives and cryptanalysis of these primitives; basic algebra and number theory for cryptologists; public key cryptography and cryptanalysis of these schemes; and other cryptographic protocols, e.g. secret sharing, zero-knowledge proofs and undeniable signature schemes. A Classical Introduction to Cryptography: Applications for Communications Security is designed for upper-level undergraduate and graduate-level students in computer science. This book is also suitable for researchers and practitioners in industry. A separate exercise/solution booklet is available as well, please go to www.springeronline.com under author: Vaudenay for additional details on how to purchase this booklet.

Applications of Abstract Algebra with Maple and MATLAB, Second Edition - Richard Klima 2006-07-12

Eliminating the need for heavy number-crunching, sophisticated mathematical software packages open the door to areas like cryptography, coding theory, and combinatorics that are dependent on abstract algebra. Applications of Abstract Algebra with Maple and MATLAB®, Second Edition explores these topics and shows how to apply the software programs to abstract algebra and its related fields. Carefully integrating MapleTM and MATLAB®, this book provides an in-depth introduction to real-world abstract algebraic problems. The first chapter offers a concise and comprehensive review of prerequisite advanced mathematics. The next several chapters examine block designs, coding theory, and cryptography while the final chapters cover counting techniques, including Pólya's and Burnside's theorems. Other topics discussed include the Rivest, Shamir, and Adleman (RSA) cryptosystem, digital signatures, primes for security, and elliptic curve cryptosystems. New to the Second Edition Three new chapters on Vigenère ciphers, the Advanced Encryption Standard (AES), and graph theory as well as new MATLAB and Maple sections Expanded exercises and additional research exercises Maple and MATLAB files and functions available for download online and from a CD-ROM With the incorporation of MATLAB, this second edition further illuminates the topics discussed by eliminating extensive computations of abstract algebraic techniques. The clear organization of the book as well as the inclusion of two of the most respected mathematical software packages available make the book a useful tool for students, mathematicians, and computer scientists.

Trusted Platform Module Basics - Steven L. Kinney 2006-09-13

Clear, practical tutorial style text with real-world applications First book on TPM for embedded designers Provides a sound foundation on the TPM, helping designers take advantage of hardware security based on sound TCG standards Covers all the TPM basics, discussing in detail the TPM Key Hierarchy and the Trusted Platform Module specification Presents a methodology to enable designers and developers to successfully integrate the TPM into an embedded design and verify the TPM's operation on a specific platform This sound foundation on the TPM provides clear, practical tutorials with detailed real-world application examples The author is reknowned for training embedded systems developers to successfully implement the TPM worldwide

Graph Theory and Its Applications, Second Edition - Jonathan L. Gross 2005-09-22

Already an international bestseller, with the release of this greatly enhanced second edition, Graph Theory and Its Applications is now an even better choice as a textbook for a variety of courses -- a textbook that will continue to serve your students as a reference for years to come. The superior explanations, broad coverage, and abundance of illustrations and exercises that positioned this as the premier graph theory text remain, but are now augmented by a broad range of improvements. Nearly 200 pages have been added for this edition, including nine new sections and hundreds of new exercises, mostly non-routine. What else is new? New chapters on measurement and analytic graph theory Supplementary exercises in each chapter - ideal for reinforcing,

reviewing, and testing. Solutions and hints, often illustrated with figures, to selected exercises - nearly 50 pages worth Reorganization and extensive revisions in more than half of the existing chapters for smoother flow of the exposition Foreshadowing - the first three chapters now preview a number of concepts, mostly via the exercises, to pique the interest of reader Gross and Yellen take a comprehensive approach to graph theory that integrates careful exposition of classical developments with emerging methods, models, and practical needs. Their unparalleled treatment provides a text ideal for a two-semester course and a variety of one-semester classes, from an introductory one-semester course to courses slanted toward classical graph theory, operations research, data structures and algorithms, or algebra and topology.

Algebraic Number Theory - 2011-01-05

Bringing the material up to date to reflect modern applications, Algebraic Number Theory, Second Edition has been completely rewritten and reorganized to incorporate a new style, methodology, and presentation. This edition focuses on integral domains, ideals, and unique factorization in the first chapter; field extensions in the second chapter; and

Introduction to Combinatorics - W.D. Wallis 2011-06-30

Accessible to undergraduate students, Introduction to Combinatorics presents approaches for solving counting and structural questions. It looks at how many ways a selection or arrangement can be chosen with a specific set of properties and determines if a selection or arrangement of objects exists that has a particular set of properties. To give students a better idea of what the subject covers, the authors first discuss several examples of typical combinatorial problems. They also provide basic information on sets, proof techniques, enumeration, and graph theory—topics that appear frequently throughout the book. The next few chapters explore enumerative ideas, including the pigeonhole principle and inclusion/exclusion. The text then covers enumerative functions and the relations between them. It describes generating functions and recurrences, important families of functions, and the theorems of Pólya and Redfield. The authors also present introductions to computer algebra and group theory, before considering structures of particular interest in combinatorics: graphs, codes, Latin squares, and experimental designs. The last chapter further illustrates the interaction between linear algebra and combinatorics. Exercises and problems of varying levels of difficulty are included at the end of each chapter. Ideal for undergraduate students in mathematics taking an introductory course in combinatorics, this text explores the different ways of arranging objects and selecting objects from a set. It clearly explains how to solve the various problems that arise in this branch of mathematics.

Design Theory - Charles C. Lindner 2017-03-27

Design Theory, Second Edition presents some of the most important techniques used for constructing combinatorial designs. It augments the descriptions of the constructions with many figures to help students understand and enjoy this branch of mathematics. This edition now offers a thorough development of the embedding of Latin squares and combinatorial designs. It also presents some pure mathematical ideas, including connections between universal algebra and graph designs. The authors focus on several basic designs, including Steiner triple systems, Latin squares, and finite projective and affine planes. They produce these designs using flexible constructions and then add interesting properties that may be required, such as resolvability, embeddings, and orthogonality. The authors also construct more complicated structures, such as Steiner quadruple systems. By providing both classical and state-of-the-art construction techniques, this book enables students to produce many other types of designs.

Bijective Combinatorics - Nicholas Loehr 2011-02-10

Bijective proofs are some of the most elegant and powerful techniques in all of mathematics. Suitable for readers without prior background in algebra or combinatorics, Bijective Combinatorics presents a general introduction to enumerative and algebraic combinatorics that emphasizes bijective methods.The text systematically develops the mathematical

The Industrial Information Technology Handbook - Richard Zurawski 2018-10-03

The Industrial Information Technology Handbook focuses on existing and emerging industrial applications of IT, and on evolving trends that are driven by the needs of companies and by industry-led consortia and organizations. Emphasizing fast growing areas that have major impacts on industrial automation and enterprise integration, the Handbook covers topics such as industrial communication technology, sensors, and embedded systems. The book is organized into two parts. Part 1 presents material covering new and quickly evolving aspects of IT. Part 2 introduces cutting-edge areas of industrial IT. The Handbook presents material in the form of tutorials, surveys, and technology overviews, combining fundamentals and advanced issues, with articles grouped into sections for a cohesive and comprehensive presentation. The text contains 112 contributed reports by industry experts from government, companies at the forefront of development, and some of the most renowned academic and research institutions worldwide. Several of the reports on recent developments, actual deployments, and trends cover subject matter presented to the public for the first time.

Advanced Number Theory with Applications - Richard A. Mollin 2009-08-26

Exploring one of the most dynamic areas of mathematics, Advanced Number Theory with Applications covers a wide range of algebraic, analytic, combinatorial, cryptographic, and geometric aspects of number theory. Written by a recognized leader in algebra and number theory, the book includes a page reference for every citing in the bibliography and mo

Techniques for Designing and Analyzing Algorithms - Douglas R. Stinson 2021-08-05

Techniques for Designing and Analyzing Algorithms Design and analysis of algorithms can be a difficult subject for students due to its sometimes-abstract nature and its use of a wide variety of mathematical tools. Here the author, an experienced and successful textbook writer, makes the subject as straightforward as possible in an up-to-date textbook incorporating various new developments appropriate for an introductory course. This text presents the main techniques of algorithm design, namely, divide-and-conquer algorithms, greedy algorithms, dynamic programming algorithms, and backtracking. Graph algorithms are studied in detail, and a careful treatment of the theory of NP-completeness is presented. In addition, the text includes useful introductory material on mathematical background including order notation, algorithm analysis and reductions, and basic data structures. This will serve as a useful review and reference for students who have covered this material in a previous course. Features The first three chapters provide a mathematical review, basic algorithm analysis, and data structures Detailed pseudocode descriptions of the algorithms along with illustrative algorithms are included Proofs of correctness of algorithms are included when appropriate The book presents a suitable amount of mathematical rigor After reading and understanding the material in this book, students will be able to apply the basic design principles to various real-world problems that they may encounter in their future professional careers.

Combinatorial Designs - Douglas Stinson 2007-05-08

Created to teach students many of the most important techniques used for constructing combinatorial designs, this is an ideal textbook for advanced undergraduate and graduate courses in combinatorial design theory. The text features clear explanations of basic designs, such as Steiner and Kirkman triple systems, mutual orthogonal Latin squares, finite projective and affine planes, and Steiner quadruple systems. In these settings, the student will master various construction techniques, both classic and modern, and will be well-prepared to construct a vast array of combinatorial designs. Design theory offers a progressive approach to the subject, with carefully ordered results. It begins with simple constructions that gradually increase in complexity. Each design has a construction that contains new ideas or that reinforces and builds upon similar ideas previously introduced. A new text/reference covering all apsects of modern combinatorial design theory. Graduates and professionals in computer science, applied mathematics, combinatorics, and applied statistics will find the book an essential resource.

Cryptography - Douglas R. Stinson 1995-03-17

Major advances over the last five years precipitated this major revision of the bestselling Cryptography: Theory and Practice. With more than 40 percent new or updated material, the second edition now provides an even more comprehensive treatment of modern cryptography. It focuses on the new Advanced Encryption Standards and features an entirely new chapter on that subject. Another new chapter explores the applications of secret sharing schemes, including ramp schemes, visual cryptography, threshold cryptography, and broadcast encryption. This is an ideal introductory text for both computer science and mathematics students and a valuable reference for professionals.

Introduction to Cryptography with Open-Source Software - Alasdair McAndrew 2016-04-19

Once the privilege of a secret few, cryptography is now taught at universities around the world. Introduction to Cryptography with Open-Source Software illustrates algorithms and cryptosystems using examples and the open-source computer algebra system of Sage. The author, a noted educator in the field, provides a highly practical learning experience by progressing at a gentle pace, keeping mathematics at a manageable level, and including numerous end-of-chapter exercises. Focusing on the cryptosystems themselves rather than the means of breaking them, the book first explores when and how the methods of modern cryptography can be used and misused. It then presents number theory and the algorithms and methods that make up the basis of cryptography today. After a brief review of "classical" cryptography, the book introduces information theory and examines the public-key cryptosystems of RSA and Rabin's cryptosystem. Other public-key systems studied include the El Gamal cryptosystem, systems based on knapsack problems, and algorithms for creating digital signature schemes. The second half of the text moves on to consider bit-oriented secret-key, or symmetric, systems suitable for encrypting large amounts of data. The author describes block ciphers (including the Data Encryption Standard), cryptographic hash functions, finite fields, the Advanced Encryption Standard, cryptosystems based on elliptical curves, random number generation, and stream ciphers. The book concludes with a look at examples and applications of modern cryptographic systems, such as multi-party computation, zero-knowledge proofs, oblivious transfer, and voting protocols.

Information Security, Coding Theory and Related Combinatorics - Dean Crnković 2011

"Published in cooperation with NATO Emerging Security Challenges Division"--T.p.

Handbook of Linear Algebra, Second Edition - Leslie Hogben 2013-11-26

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.

Handbook of Graph Theory, Second Edition - Jonathan L. Gross 2013-12-17

In the ten years since the publication of the best-selling first edition, more than 1,000 graph theory papers have been published each year. Reflecting these advances, Handbook of Graph Theory, Second Edition provides comprehensive coverage of the main topics in pure and applied graph theory. This second edition—over 400 pages longer than its predecessor—incorporates 14 new sections. Each chapter includes lists of essential definitions and facts, accompanied by examples, tables, remarks, and, in some cases, conjectures and open problems. A bibliography at the end of each chapter provides an extensive guide to the research literature and pointers to monographs. In addition, a glossary is included in each chapter as well as at the end of each section. This edition also contains notes regarding terminology and notation. With 34 new contributors, this handbook is the most comprehensive single-source guide to graph theory. It emphasizes quick accessibility to topics for non-experts and enables easy cross-referencing among chapters.

Handbook of Finite Fields - Gary L. Mullen 2013-06-17

Poised to become the leading reference in the field, the Handbook of Finite Fields is exclusively devoted to the theory and applications of finite fields. More than 80 international contributors compile state-of-the-art research in this definitive handbook. Edited by two renowned researchers, the book uses a uniform style and format throughout and

Introduction to Cryptography with Mathematical Foundations and Computer Implementations - Alexander Stanoyevitch 2010-08-09

From the exciting history of its development in ancient times to the present day, Introduction to Cryptography with Mathematical Foundations and Computer Implementations provides a focused tour of the central concepts of cryptography. Rather than present an encyclopedic treatment of topics in cryptography, it delineates cryptographic concepts in chronological order, developing the mathematics as needed. Written in an engaging yet rigorous style, each chapter introduces important concepts with clear definitions and theorems. Numerous examples explain key points while figures and tables help illustrate more difficult or subtle concepts. Each chapter is punctuated with "Exercises for the Reader;" complete solutions for these are included in an appendix. Carefully crafted exercise sets are also provided at the end of each chapter, and detailed solutions to most odd-numbered exercises can be found in a designated appendix. The computer implementation section at the end of every chapter guides students through the process of writing their own programs. A supporting website provides an extensive set of sample programs as well as downloadable platform-independent applet pages for some core programs and algorithms. As the reliance on cryptography by business, government, and industry continues and new technologies for transferring data become available, cryptography plays a permanent, important role in day-to-day operations. This self-contained sophomore-level text traces the evolution of the field, from its origins through present-day cryptosystems, including public key cryptography and elliptic curve cryptography.

Graph Polynomials - Yongtang Shi 2016-11-25

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.

Handbook of Product Graphs - Richard Hammack 2011-06-06

This handbook examines the dichotomy between the structure of products and their subgraphs. It also features the design of efficient algorithms that recognize products and their subgraphs and explores the relationship between graph parameters of the product and factors. Extensively revised and expanded, this second edition presents full proofs of many important results as well as up-to-date research and

conjectures. It illustrates applications of graph products in several areas and contains well over 300 exercises. Supplementary material is available on the book's website.

How to Count - R.B.J.T. Allenby 2011-07-01

Emphasizes a Problem Solving Approach A first course in combinatorics Completely revised, How to Count: An Introduction to Combinatorics, Second Edition shows how to solve numerous classic and other interesting combinatorial problems. The authors take an easily accessible approach that introduces problems before leading into the theory involved. Although the authors present most of the topics through concrete problems, they also emphasize the importance of proofs in mathematics. New to the Second Edition This second edition incorporates 50 percent more material. It includes seven new chapters that cover occupancy problems, Stirling and Catalan numbers, graph theory, trees, Dirichlet’s pigeonhole principle, Ramsey theory, and rook polynomials. This edition also contains more than 450 exercises. Ideal for both classroom teaching and self-study, this text requires only a modest amount of mathematical background. In an engaging way, it covers many combinatorial tools, such as the inclusion-exclusion principle, generating functions, recurrence relations, and Pólya’s counting theorem.

Handbook of Discrete and Computational Geometry, Second Edition - Csaba D. Toth 2004-04-13

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 manymore, 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 then 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

Cryptography and Coding - Bahram Honary 2001-12-10

This book constitutes the refereed proceedings of the 8th International IMA Conference on Cryptography and Coding held in Cirencester, UK in December 2001. The 33 revised full papers presented together with four invited papers were carefully reviewed and selected from numerous submissions. Among the topics covered are mathematical bounds, statistical decoding schemes for error-correcting codes, multifunctional and multiple access communication systems, low density parity check codes, iterative coding, authentication, key recovery attacks, stream cipher design, analysis of ECIES algorithms, and lattice bases attacks on IP based protocols.

Introduction to Information Theory and Data Compression, Second Edition - D.C. Hankerson 2003-02-26

An effective blend of carefully explained theory and practical applications, this text imparts the fundamentals of both information theory and data compression. Although the two topics are related, this unique text allows either topic to be presented independently, and it was specifically designed so that the data compression section requires no prior knowledge of information theory. The treatment of information theory, while theoretical and abstract, is quite elementary, making this text less daunting than many others. After presenting the fundamental definitions and results of the theory, the authors then apply the theory to memoryless, discrete channels with zeroth-order, one-state sources. The chapters on data compression acquaint students with a myriad of lossless

compression methods and then introduce two lossy compression methods. Students emerge from this study competent in a wide range of techniques. The authors' presentation is highly practical but includes some important proofs, either in the text or in the exercises, so instructors can, if they choose, place more emphasis on the mathematics. Introduction to Information Theory and Data Compression, Second Edition is ideally suited for an upper-level or graduate course for students in mathematics, engineering, and computer science. Features: Expanded discussion of the historical and theoretical basis of information theory that builds a firm, intuitive grasp of the subject Reorganization of theoretical results along with new exercises, ranging from the routine to the more difficult, that reinforce students' ability to apply the definitions and results in specific situations. Simplified treatment of the algorithm(s) of Gallager and Knuth Discussion of the information rate of a code and the trade-off between error correction and information rate Treatment of probabilistic finite state source automata, including basic results, examples, references, and exercises Octave and MATLAB image compression codes included in an appendix for use with the exercises and projects involving transform methods Supplementary materials, including software, available for download from the authors' Web site at www.dms.auburn.edu/compression

Handbook of Elliptic and Hyperelliptic Curve Cryptography - Henri Cohen 2005-07-19

The discrete logarithm problem based on elliptic and hyperelliptic curves has gained a lot of popularity as a cryptographic primitive. The main reason is that no subexponential algorithm for computing discrete logarithms on small genus curves is currently available, except in very special cases. Therefore curve-based cryptosystems require much smaller key sizes than RSA to attain the same security level. This makes them particularly attractive for implementations on memory-restricted devices like smart cards and in high-security applications. The Handbook of Elliptic and Hyperelliptic Curve Cryptography introduces the theory and algorithms involved in curve-based cryptography. After a very detailed exposition of the mathematical background, it provides ready-to-implement algorithms for the group operations and computation of pairings. It explores methods for point counting and constructing curves with the complex multiplication method and provides the algorithms in an explicit manner. It also surveys generic methods to compute discrete logarithms and details index calculus methods for hyperelliptic curves. For some special curves the discrete logarithm problem can be transferred to an easier one; the consequences are explained and suggestions for good choices are given. The authors present applications to protocols for discrete-logarithm-based systems (including bilinear structures) and explain the use of elliptic and hyperelliptic curves in factorization and primality proving. Two chapters explore their design and efficient implementations in smart cards. Practical and theoretical aspects of side-channel attacks and countermeasures and a chapter devoted to (pseudo-)random number generation round off the exposition. The broad coverage of all- important areas makes this book a complete handbook of elliptic and hyperelliptic curve cryptography and an invaluable reference to anyone interested in this exciting field.

Pearls of Discrete Mathematics - Martin Erickson 2009-09-16

Methods Used to Solve Discrete Math ProblemsInteresting examples highlight the interdisciplinary nature of this areaPearls of Discrete Mathematics presents methods for solving counting problems and other types of problems that involve discrete structures. Through intriguing examples, problems, theorems, and proofs, the book illustrates the relation

Introduction to Modern Cryptography - Jonathan Katz 2020-12-21

Now the most used texbook for introductory cryptography courses in both mathematics and computer science, the Third Edition builds upon previous editions by offering several new sections, topics, and exercises. The authors present the core principles of modern cryptography, with emphasis on formal definitions, rigorous proofs of security.

Cryptanalysis of Number Theoretic Ciphers - Samuel S. Wagstaff, Jr. 2019-08-22

At the heart of modern cryptographic algorithms lies computational number theory. Whether you're encrypting or decrypting ciphers, a solid

background in number theory is essential for success. Written by a number theorist and practicing cryptographer, Cryptanalysis of Number Theoretic Ciphers takes you from basic number theory to the inner workings of ciphers and protocols. First, the book provides the mathematical background needed in cryptography as well as definitions and simple examples from cryptography. It includes summaries of elementary number theory and group theory, as well as common methods of finding or constructing large random primes, factoring large integers, and computing discrete logarithms. Next, it describes a selection of cryptographic algorithms, most of which use number theory. Finally, the book presents methods of attack on the cryptographic algorithms and assesses their effectiveness. For each attack method the author lists the systems it applies to and tells how they may be broken with it. Computational number theorists are some of the most successful cryptanalysts against public key systems. Cryptanalysis of Number Theoretic Ciphers builds a solid foundation in number theory and shows you how to apply it not only when breaking ciphers, but also when designing ones that are difficult to break.

Cryptography in C and C++ - Michael Welschenbach 2001-03-19

Cryptography in C and C++ mainly focuses on the practical aspects involved in implementing public key cryptography methods, such as the RSA algorithm that was released from patent protection. It also gives both a technical overview and an implementation of the Rijndael algorithm that was selected as the Advanced Encryption Standard by the U.S. government. Author Michael Welschenbach avoids complexities by explaining cryptography and its mathematical basis in terms a programmer can easily understand. This book offers a comprehensive yet relentlessly practical overview of the fundamentals of modern cryptography. It contains a wide-ranging library of code in C and C++, including the RSA algorithm, completed by an extensive Test Suite that proves that the code works correctly. Readers will learn, step by step, how to implement a platform-independent library for the all-important multiprecision arithmetic used in modern cryptography. This is followed by an implementation of the cryptographic algorithms themselves. The CD-ROM includes all the programs presented in the book, x86 assembler programs for basic arithmetical operations, implementations of the new Rijndael Advanced Encryption Standard algorithm in both C and C++, and more.

Serious Cryptography - Jean-Philippe Aumasson 2017-11-06

This practical guide to modern encryption breaks down the fundamental mathematical concepts at the heart of cryptography without shying away from meaty discussions of how they work. You'll learn about authenticated encryption, secure randomness, hash functions, block ciphers, and public-key techniques such as RSA and elliptic curve cryptography. You'll also learn: - Key concepts in cryptography, such as computational security, attacker models, and forward secrecy - The strengths and limitations of the TLS protocol behind HTTPS secure websites - Quantum computation and post-quantum cryptography - About various vulnerabilities by examining numerous code examples and use cases - How to choose the best algorithm or protocol and ask vendors the right questions Each chapter includes a discussion of common implementation mistakes using real-world examples and details what could go wrong and how to avoid these pitfalls. Whether you're a seasoned practitioner or a beginner looking to dive into the field, Serious Cryptography will provide a complete survey of modern encryption and its applications.

A Student's Guide to the Study, Practice, and Tools of Modern Mathematics - Donald Bindner 2010-11-29

A Student's Guide to the Study, Practice, and Tools of Modern Mathematics provides an accessible introduction to the world of mathematics. It offers tips on how to study and write mathematics as well as how to use various mathematical tools, from LaTeX and Beamer to Mathematica® and MapleTM to MATLAB® and R. Along with a color insert, the text includes exercises and challenges to stimulate creativity and improve problem solving abilities. The first section of the book covers issues pertaining to studying mathematics. The authors explain how to write mathematical proofs and papers, how to perform mathematical research, and how to give mathematical presentations. The

second section focuses on the use of mathematical tools for mathematical typesetting, generating data, finding patterns, and much more. The text describes how to compose a LaTeX file, give a presentation using Beamer, create mathematical diagrams, use computer algebra systems, and display ideas on a web page. The authors cover both popular commercial software programs and free and open source software, such as Linux and R. Showing how to use technology to understand mathematics, this guide supports students on their way to becoming professional mathematicians. For beginning mathematics students, it helps them study for tests and write papers. As time progresses, the book aids them in performing advanced activities, such as computer programming, typesetting, and research.

Foundations of Coding - Jean-Guillaume Dumas 2015-01-05

Offers a comprehensive introduction to the fundamentalstructures and applications of a wide range of contemporary codingoperations This book offers a comprehensive introduction to the fundamentalstructures and applications of a wide range of contemporary codingoperations. This text focuses on the ways to structure informationso that its transmission will be in the safest, quickest, and mostefficient and error-free manner possible. All coding operations arecovered in a single framework, with initial chapters addressingearly mathematical models and algorithmic developments which led tothe structure of code. After discussing the general foundations ofcode, chapters proceed to cover individual topics such as notionsof compression, cryptography, detection, and correction codes. Bothclassical coding theories and the most cutting-edge models areaddressed, along with helpful exercises of varying complexities toenhance comprehension. Explains how to structure coding information so that itstransmission is safe, error-free, efficient, and fast Includes a pseudo-code that readers may implement in theirpreferential programming language Features descriptive diagrams and illustrations, and almost 150exercises, with corrections, of varying complexity to enhancecomprehension Foundations of Coding: Compression, Encryption,Error-Correction is an invaluable resource for understandingthe various ways information is structured for its secure andreliable transmission in the 21st-century world.

Finite-Dimensional Linear Algebra - Mark S. Gockenbach 2011-06-15

Linear algebra forms the basis for much of modern mathematics—theoretical, applied, and computational. Finite-Dimensional Linear Algebra provides a solid foundation for the study of advanced mathematics and discusses applications of linear algebra to such diverse areas as combinatorics, differential equations, optimization, and approximation. The author begins with an overview of the essential themes of the book: linear equations, best approximation, and diagonalization. He then takes students through an axiomatic development of vector spaces, linear operators, eigenvalues, norms, and inner products. In addition to discussing the special properties of symmetric matrices, he covers the Jordan canonical form, an important theoretical tool, and the singular value decomposition, a powerful tool for computation. The final chapters present introductions to numerical linear algebra and analysis in vector spaces, including a brief introduction to functional analysis (infinite-dimensional linear algebra). Drawing on material from the author’s own course, this textbook gives students a strong theoretical understanding of linear algebra. It offers many illustrations of how linear algebra is used throughout mathematics.