

Mathematical Structures For Computer Science A Modern Treatment Of Discrete Mathematics 5th Edition

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Algebraic and Discrete Mathematical Methods for Modern Biology - Raina Robeva 2015-05-09
Written by experts in both mathematics and biology, Algebraic and Discrete Mathematical Methods for Modern Biology offers a bridge between math and biology, providing a framework for simulating, analyzing, predicting, and modulating the behavior of complex biological systems. Each chapter begins with a question from modern biology, followed by the description of certain mathematical methods and theory appropriate in the search of answers. Every topic provides a fast-track pathway through the problem by presenting the biological foundation, covering the relevant mathematical theory, and highlighting connections between them. Many of the projects and exercises embedded in each chapter utilize specialized software, providing students with much-needed familiarity and experience with computing applications, critical components of the "modern biology" skill set. This book is appropriate for mathematics courses such as finite mathematics, discrete structures, linear algebra, abstract/modern algebra, graph theory, probability, bioinformatics, statistics, biostatistics, and modeling, as well as for biology courses such as genetics, cell and molecular biology, biochemistry, ecology, and evolution. Examines significant questions in modern biology and their mathematical treatments
Presents important mathematical concepts and

tools in the context of essential biology Features material of interest to students in both mathematics and biology Presents chapters in modular format so coverage need not follow the Table of Contents Introduces projects appropriate for undergraduate research Utilizes freely accessible software for visualization, simulation, and analysis in modern biology Requires no calculus as a prerequisite Provides a complete Solutions Manual Features a companion website with supplementary resources

Mathematics and Computation, a Contemporary View - Hans Munthe-Kaas 2008-09-29

The 2006 Abel symposium is focusing on contemporary research involving interaction between computer science, computational science and mathematics. In recent years, computation has been affecting pure mathematics in fundamental ways. Conversely, ideas and methods of pure mathematics are becoming increasingly important within computational and applied mathematics. At the core of computer science is the study of computability and complexity for discrete mathematical structures. Studying the foundations of computational mathematics raises similar questions concerning continuous mathematical structures. There are several reasons for these developments. The exponential growth of computing power is bringing

computational methods into ever new application areas. Equally important is the advance of software and programming languages, which to an increasing degree allows the representation of abstract mathematical structures in program code. Symbolic computing is bringing algorithms from mathematical analysis into the hands of pure and applied mathematicians, and the combination of symbolic and numerical techniques is becoming increasingly important both in computational science and in areas of pure mathematics.

Modern Mathematics And Applications In Computer Graphics And Vision - Hongyu Guo
2014-04-01

This book presents a concise exposition of modern mathematical concepts, models and methods with applications in computer graphics, vision and machine learning. The compendium is organized in four parts — Algebra, Geometry, Topology, and Applications. One of the features is a unique treatment of tensor and manifold topics to make them easier for the students. All proofs are omitted to give an emphasis on the exposition of the concepts. Effort is made to help students to build intuition and avoid parrot-like learning. There is minimal inter-chapter dependency. Each chapter can be used as an independent crash course and the reader can start reading from any chapter — almost. This book is intended for upper level undergraduate students, graduate students and researchers in computer graphics, geometric modeling, computer vision, pattern recognition and machine learning. It can be used as a reference book, or a textbook for a selected topics course with the instructor's choice of any of the topics.

[A Mathematical Introduction to Electronic Structure Theory](#) - Lin Lin 2019-06-05

Based on first principle quantum mechanics, electronic structure theory is widely used in physics, chemistry, materials science, and related fields and has recently received increasing research attention in applied and computational mathematics. This book provides a self-contained, mathematically oriented introduction to the subject and its associated algorithms and analysis. It will help applied mathematics students and researchers with minimal background in physics understand the basics of electronic structure theory and prepare

them to conduct research in this area. The book begins with an elementary introduction of quantum mechanics, including the uncertainty principle and the Hartree-Fock theory, which is considered the starting point of modern electronic structure theory. The authors then provide an in-depth discussion of two carefully selected topics that are directly related to several aspects of modern electronic structure calculations: density matrix based algorithms and linear response theory. Chapter 2 introduces the Kohn-Sham density functional theory with a focus on the density matrix based numerical algorithms, and Chapter 3 introduces linear response theory, which provides a unified viewpoint of several important phenomena in physics and numerics. An understanding of these topics will prepare readers for more advanced topics in this field. The book concludes with the random phase approximation to the correlation energy. The book is written for advanced undergraduate and beginning graduate students, specifically those with mathematical backgrounds but without a priori knowledge of quantum mechanics, and can be used for self-study by researchers, instructors, and other scientists. The book can also serve as a starting point to learn about many-body perturbation theory, a topic at the frontier of the study of interacting electrons.

Discrete Mathematics for Computer Science - Jon Pierre Fortney 2020-12-23

Discrete Mathematics for Computer Science: An Example-Based Introduction is intended for a first- or second-year discrete mathematics course for computer science majors. It covers many important mathematical topics essential for future computer science majors, such as algorithms, number representations, logic, set theory, Boolean algebra, functions, combinatorics, algorithmic complexity, graphs, and trees. Features Designed to be especially useful for courses at the community-college level Ideal as a first- or second-year textbook for computer science majors, or as a general introduction to discrete mathematics Written to be accessible to those with a limited mathematics background, and to aid with the transition to abstract thinking Filled with over 200 worked examples, boxed for easy reference, and over 200 practice problems with answers

Contains approximately 40 simple algorithms to aid students in becoming proficient with algorithm control structures and pseudocode. Includes an appendix on basic circuit design which provides a real-world motivational example for computer science majors by drawing on multiple topics covered in the book to design a circuit that adds two eight-digit binary numbers. Jon Pierre Fortney graduated from the University of Pennsylvania in 1996 with a BA in Mathematics and Actuarial Science and a BSE in Chemical Engineering. Prior to returning to graduate school, he worked as both an environmental engineer and as an actuarial analyst. He graduated from Arizona State University in 2008 with a PhD in Mathematics, specializing in Geometric Mechanics. Since 2012, he has worked at Zayed University in Dubai. This is his second mathematics textbook.

Discrete Mathematics - Oscar Levin 2018-12-31
 Note: This is the 3rd edition. If you need the 2nd edition for a course you are taking, it can be found as a "other format" on amazon, or by searching its isbn: 1534970746. This gentle introduction to discrete mathematics is written for first and second year math majors, especially those who intend to teach. The text began as a set of lecture notes for the discrete mathematics course at the University of Northern Colorado. This course serves both as an introduction to topics in discrete math and as the "introduction to proof" course for math majors. The course is usually taught with a large amount of student inquiry, and this text is written to help facilitate this. Four main topics are covered: counting, sequences, logic, and graph theory. Along the way proofs are introduced, including proofs by contradiction, proofs by induction, and combinatorial proofs. The book contains over 470 exercises, including 275 with solutions and over 100 with hints. There are also Investigate! activities throughout the text to support active, inquiry based learning. While there are many fine discrete math textbooks available, this text has the following advantages: It is written to be used in an inquiry rich course. It is written to be used in a course for future math teachers. It is open source, with low cost print editions and free electronic editions. This third edition brings improved exposition, a new section on trees, and a bunch of new and improved exercises. For a

complete list of changes, and to view the free electronic version of the text, visit the book's website at discrete.openmathbooks.org

Mathematical Structures for Computer Science - Judith L. Gersting 2007

This edition offers a pedagogically rich and intuitive introduction to discrete mathematics structures. It meets the needs of computer science majors by being both comprehensive and accessible.

Discrete Mathematical Structures for Computer Science - Ronald E. Prather 1976

Concrete Mathematics: A Foundation for Computer Science - Ronald L. Graham 1994

Discrete Mathematics for Computer Science - Gary Haggard 2005

Master the fundamentals of discrete mathematics with DISCRETE MATHEMATICS FOR COMPUTER SCIENCE with Student Solutions Manual CD-ROM! An increasing number of computer scientists from diverse areas are using discrete mathematical structures to explain concepts and problems and this mathematics text shows you how to express precise ideas in clear mathematical language. Through a wealth of exercises and examples, you will learn how mastering discrete mathematics will help you develop important reasoning skills that will continue to be useful throughout your career.

Finite Model Theory and Its Applications - Erich Grädel 2007-04-24

Finite model theory, as understood here, is an area of mathematical logic that has developed in close connection with applications to computer science, in particular the theory of computational complexity and database theory. One of the fundamental insights of mathematical logic is that our understanding of mathematical phenomena is enriched by elevating the languages we use to describe mathematical structures to objects of explicit study. If mathematics is the science of patterns, then the media through which we discern patterns, as well as the structures in which we discern them, command our attention. It is this aspect of logic which is most prominent in model theory, "the branch of mathematical logic which deals with the relation between a formal

language and its interpretations". No wonder, then, that mathematical logic, and finite model theory in particular, should find manifold applications in computer science: from specifying programs to querying databases, computer science is rife with phenomena whose understanding requires close attention to the interaction between language and structure. This volume gives a broad overview of some central themes of finite model theory: expressive power, descriptive complexity, and zero-one laws, together with selected applications to database theory and artificial intelligence, especially constraint databases and constraint satisfaction problems. The final chapter provides a concise modern introduction to modal logic, which emphasizes the continuity in spirit and technique with finite model theory.

Discrete Mathematical Structures - D. S. Malik 2004

Teaches students the mathematical foundations of computer science, including logic, Boolean algebra, basic graph theory, finite state machines, grammars and algorithms, and helps them understand mathematical reasoning for reading, comprehension and construction of mathematical arguments.

Discrete Mathematical Structures for Computer Science - Bernard Kolman 1987

This text has been designed as a complete introduction to discrete mathematics, primarily for computer science majors in either a one or two semester course. The topics addressed are of genuine use in computer science, and are presented in a logically coherent fashion. The material has been organized and interrelated to minimize the mass of definitions and the abstraction of some of the theory. For example, relations and directed graphs are treated as two aspects of the same mathematical idea. Whenever possible each new idea uses previously encountered material, and then developed in such a way that it simplifies the more complex ideas that follow.

Mathematical Structures for Computer Science - Judith L. Gersting 2003

New edition of the classic discrete mathematics text for computer science majors.

Discrete Mathematics - Douglas E. Ensley 2005-10-07

Did you know that games and puzzles have given

birth to many of today's deepest mathematical subjects? Now, with Douglas Ensley and Winston Crawley's *Introduction to Discrete Mathematics*, you can explore mathematical writing, abstract structures, counting, discrete probability, and graph theory, through games, puzzles, patterns, magic tricks, and real-world problems. You will discover how new mathematical topics can be applied to everyday situations, learn how to work with proofs, and develop your problem-solving skills along the way. Online applications help improve your mathematical reasoning. Highly intriguing, interactive Flash-based applications illustrate key mathematical concepts and help you develop your ability to reason mathematically, solve problems, and work with proofs. Explore More icons in the text direct you to online activities at www.wiley.com/college/ensley. Improve your grade with the Student Solutions Manual. A supplementary Student Solutions Manual contains more detailed solutions to selected exercises in the text.

Practical Discrete Mathematics - Ryan T. White 2021-02-22

A practical guide simplifying discrete math for curious minds and demonstrating its application in solving problems related to software development, computer algorithms, and data science

Key Features Apply the math of countable objects to practical problems in computer science Explore modern Python libraries such as scikit-learn, NumPy, and SciPy for performing mathematics Learn complex statistical and mathematical concepts with the help of hands-on examples and expert guidance

Book Description Discrete mathematics deals with studying countable, distinct elements, and its principles are widely used in building algorithms for computer science and data science. The knowledge of discrete math concepts will help you understand the algorithms, binary, and general mathematics that sit at the core of data-driven tasks. Practical Discrete Mathematics is a comprehensive introduction for those who are new to the mathematics of countable objects. This book will help you get up to speed with using discrete math principles to take your computer science skills to a more advanced level. As you learn the language of discrete mathematics, you'll also

cover methods crucial to studying and describing computer science and machine learning objects and algorithms. The chapters that follow will guide you through how memory and CPUs work. In addition to this, you'll understand how to analyze data for useful patterns, before finally exploring how to apply math concepts in network routing, web searching, and data science. By the end of this book, you'll have a deeper understanding of discrete math and its applications in computer science, and be ready to work on real-world algorithm development and machine learning. What you will learn

Understand the terminology and methods in discrete math and their usage in algorithms and data problems
 Use Boolean algebra in formal logic and elementary control structures
 Implement combinatorics to measure computational complexity and manage memory allocation
 Use random variables, calculate descriptive statistics, and find average-case computational complexity
 Solve graph problems involved in routing, pathfinding, and graph searches, such as depth-first search
 Perform ML tasks such as data visualization, regression, and dimensionality reduction

Who this book is for
 This book is for computer scientists looking to expand their knowledge of discrete math, the core topic of their field. University students looking to get hands-on with computer science, mathematics, statistics, engineering, or related disciplines will also find this book useful. Basic Python programming skills and knowledge of elementary real-number algebra are required to get started with this book.

Essential Discrete Mathematics for Computer Science - Harry Lewis 2019-03-19

Discrete mathematics is the basis of much of computer science, from algorithms and automata theory to combinatorics and graph theory. *Essential Discrete Mathematics for Computer Science* aims to teach mathematical reasoning as well as concepts and skills by stressing the art of proof. It is fully illustrated in color, and each chapter includes a concise summary as well as a set of exercises.

A Logical Approach to Discrete Math - David Gries 2013-03-14

Here, the authors strive to change the way logic and discrete math are taught in computer science and mathematics: while many books

treat logic simply as another topic of study, this one is unique in its willingness to go one step further. The book treats logic as a basic tool which may be applied in essentially every other area.

Transactions on Computational Science II - Yingxu Wang 2008-09-16

The denotational and expressive needs in cognitive informatics, computational intelligence, software engineering, and knowledge engineering have led to the development of new forms of mathematics collectively known as denotational mathematics. Denotational mathematics is a category of mathematical structures that formalize rigorous expressions and long-chain inferences of system compositions and behaviors with abstract concepts, complex relations, and dynamic processes. Typical paradigms of denotational mathematics are concept algebra, system algebra, Real-Time Process Algebra (RTPA), Visual Semantic Algebra (VSA), fuzzy logic, and rough sets. A wide range of applications of denotational mathematics have been identified in many modern science and engineering disciplines that deal with complex and intricate mathematical entities and structures beyond numbers, Boolean variables, and traditional sets. This issue of Springer's *Transactions on Computational Science on Denotational Mathematics for Computational Intelligence* presents a snapshot of current research on denotational mathematics and its engineering applications. The volume includes selected and extended papers from two international conferences, namely IEEE ICCI 2006 (on Cognitive Informatics) and RSKT 2006 (on Rough Sets and Knowledge Technology), as well as new contributions. The following four important areas in denotational mathematics and its applications are covered: Foundations and applications of denotational mathematics, focusing on: a) c- temporary denotational mathematics for computational intelligence; b) deno- tional mathematical laws of software; c) a comparative study of STOPA and RTPA; and d) a denotational mathematical model of abstract games.

Discrete Mathematical Structures (Classic Version) - Bernard Kolman 2017-03-20

Originally published in 2009, reissued as part of

Pearson's modern classic series.

Discrete Mathematics - Proof Techniques And Mathematical Structures - Robert Clark Penner 1999-10-19

This book offers an introduction to mathematical proofs and to the fundamentals of modern mathematics. No real prerequisites are needed other than a suitable level of mathematical maturity. The text is divided into two parts, the first of which constitutes the core of a one-semester course covering proofs, predicate calculus, set theory, elementary number theory, relations, and functions, and the second of which applies this material to a more advanced study of selected topics in pure mathematics, applied mathematics, and computer science, specifically cardinality, combinatorics, finite-state automata, and graphs. In both parts, deeper and more interesting material is treated in optional sections, and the text has been kept flexible by allowing many different possible courses or emphases based upon different paths through the volume.

Bäcklund and Darboux Transformations - C. Rogers 2002-06-24

This book explores the deep and fascinating connections that exist between a ubiquitous class of physically important waves known as solitons and the theory of transformations of a privileged class of surfaces as they were studied by eminent geometers of the nineteenth century. Thus, nonlinear equations governing soliton propagation and also mathematical descriptions of their remarkable interaction properties are shown to arise naturally out of the classical differential geometry of surfaces and what are termed Bäcklund-Darboux transformations. This text, the first of its kind, is written in a straightforward manner and is punctuated by exercises to test the understanding of the reader. It is suitable for use in higher undergraduate or graduate level courses directed at applied mathematicians or mathematical physics.

The Nitty-Gritty in the Life of a University - William J. Adams 2007

An esteemed professor and one-time chairman of the mathematics department at New York's Pace University, Adams, interested in all facets of university administration, has produced an almost Jeffersonian volume of correspondence

from his tenure. His views on textbook selection, collective bargaining and the proper role of the university have all flowed from his notebook, and no problem was too minute to evade his scope. The frivolity of some of these papers is balanced by Adams's opinions on weightier issues, including sexual harassment and compensation in higher education. His approach and forward manner on these situations, despite how genuine, sometimes engendered resentment from his fellow faculty. But for those interested in the particulars of an academic career, this book offers a glimpse of what life may really be like inside the ivory tower. - Kirkus Discoveries-
Mathematical and Algorithmic Foundations of the Internet - Fabrizio Luccio 2011-07-06

To truly understand how the Internet and Web are organized and function requires knowledge of mathematics and computation theory.

Mathematical and Algorithmic Foundations of the Internet introduces the concepts and methods upon which computer networks rely and explores their applications to the Internet and Web. The book offers a unique approach to mathematical and algorithmic concepts, demonstrating their universality by presenting ideas and examples from various fields, including literature, history, and art.

Progressing from fundamental concepts to more specific topics and applications, the text covers computational complexity and randomness, networks and graphs, parallel and distributed computing, and search engines. While the mathematical treatment is rigorous, it is presented at a level that can be grasped by readers with an elementary mathematical background. The authors also present a lighter side to this complex subject by illustrating how many of the mathematical concepts have counterparts in everyday life. The book provides in-depth coverage of the mathematical prerequisites and assembles a complete presentation of how computer networks function. It is a useful resource for anyone interested in the inner functioning, design, and organization of the Internet.

Discrete Mathematical Structures for Computer Science - Bernard Kolman 1984

Discrete Mathematics - Rowan Garnier 2009-11-09

Taking an approach to the subject that is suitable for a broad readership, *Discrete Mathematics: Proofs, Structures, and Applications*, Third Edition provides a rigorous yet accessible exposition of discrete mathematics, including the core mathematical foundation of computer science. The approach is comprehensive yet maintains an easy-to-follow progression from the basic mathematical ideas to the more sophisticated concepts examined later in the book. This edition preserves the philosophy of its predecessors while updating and revising some of the content. New to the Third Edition In the expanded first chapter, the text includes a new section on the formal proof of the validity of arguments in propositional logic before moving on to predicate logic. This edition also contains a new chapter on elementary number theory and congruences. This chapter explores groups that arise in modular arithmetic and RSA encryption, a widely used public key encryption scheme that enables practical and secure means of encrypting data. This third edition also offers a detailed solutions manual for qualifying instructors. Exploring the relationship between mathematics and computer science, this text continues to provide a secure grounding in the theory of discrete mathematics and to augment the theoretical foundation with salient applications. It is designed to help readers develop the rigorous logical thinking required to adapt to the demands of the ever-evolving discipline of computer science.

[Discrete Mathematical Structures with Applications to Computer Science](#) - Jean-Paul Tremblay 1987

Modern Computer Arithmetic - Richard P. Brent 2010-11-25

Modern Computer Arithmetic focuses on arbitrary-precision algorithms for efficiently performing arithmetic operations such as addition, multiplication and division, and their connections to topics such as modular arithmetic, greatest common divisors, the Fast Fourier Transform (FFT), and the computation of elementary and special functions. Brent and Zimmermann present algorithms that are ready to implement in your favourite language, while keeping a high-level description and avoiding too

low-level or machine-dependent details. The book is intended for anyone interested in the design and implementation of efficient high-precision algorithms for computer arithmetic, and more generally efficient multiple-precision numerical algorithms. It may also be used in a graduate course in mathematics or computer science, for which exercises are included. These vary considerably in difficulty, from easy to small research projects, and expand on topics discussed in the text. Solutions to selected exercises are available from the authors.

[The Carnegie-Mellon Curriculum for Undergraduate Computer Science](#) - Mary Shaw 2012-12-06

This curriculum and its description were developed during the period 1981 - 1984
Elementary Overview Of Mathematical Structures, An: Algebra, Topology And Categories - Marco Grandis 2020-08-12

Since the last century, a large part of Mathematics is concerned with the study of mathematical structures, from groups to fields and vector spaces, from lattices to Boolean algebras, from metric spaces to topological spaces, from topological groups to Banach spaces. More recently, these structured sets and their transformations have been assembled in higher structures, called categories. We want to give a structural overview of these topics, where the basic facts of the different theories are unified through the 'universal properties' that they satisfy, and their particularities stand out, perhaps even more. This book can be used as a textbook for undergraduate studies and for self-study. It can provide students of Mathematics with a unified perspective of subjects which are often kept apart. It is also addressed to students and researchers of disciplines having strong interactions with Mathematics, like Physics and Chemistry, Statistics, Computer Science, Engineering.

Mathematical Structures for Computer Science - Judith L. Gersting 2014-01-01

Judith Gersting's *Mathematical Structures for Computer Science* has long been acclaimed for its clear presentation of essential concepts and its exceptional range of applications relevant to computer science majors. Now with this new edition, it is the first discrete mathematics textbook revised to meet the proposed new

ACM/IEEE standards for the course.
Discrete Mathematics - Prof. Sudarsan Nanda
2022-02-28

The book contains topics as per the model syllabus of the University Grants Commission (UGC), India and is suitable for undergraduate (B.Tech) students of computer Science and Engineering and mathematics and postgraduate students of computer Application (MCA) and mathematics. The book has been made self-contained with preliminary chapters on mathematical logic and set theory which also form the part of the syllabus. Besides these topics, the book contains subjects like combinatorics, graph theory, algebraic structures such as: groups, rings, Boolean Algebra and also topics like finite state machine (theory of computation) and probability. The book has been written in a simple and lucid manner, with examples and applications to Computer Science. Finally it contains an additional chapter on fuzzy set theory.
[Discrete mathematical structures with applications to computer science](#) - Jean-Paul Tremblay 1975

Mathematics for the Analysis of Algorithms
- Daniel H. Greene 2007-10-05

This monograph collects some fundamental mathematical techniques that are required for the analysis of algorithms. It builds on the fundamentals of combinatorial analysis and complex variable theory to present many of the major paradigms used in the precise analysis of algorithms, emphasizing the more difficult notions. The authors cover recurrence relations, operator methods, and asymptotic analysis in a format that is concise enough for easy reference yet detailed enough for those with little background with the material.

Mathematics and Computation - Avi Wigderson 2019-10-29

An introduction to computational complexity theory, its connections and interactions with mathematics, and its central role in the natural and social sciences, technology, and philosophy. *Mathematics and Computation* provides a broad, conceptual overview of computational complexity theory—the mathematical study of efficient computation. With important practical applications to computer science and industry,

computational complexity theory has evolved into a highly interdisciplinary field, with strong links to most mathematical areas and to a growing number of scientific endeavors. Avi Wigderson takes a sweeping survey of complexity theory, emphasizing the field's insights and challenges. He explains the ideas and motivations leading to key models, notions, and results. In particular, he looks at algorithms and complexity, computations and proofs, randomness and interaction, quantum and arithmetic computation, and cryptography and learning, all as parts of a cohesive whole with numerous cross-influences. Wigderson illustrates the immense breadth of the field, its beauty and richness, and its diverse and growing interactions with other areas of mathematics. He ends with a comprehensive look at the theory of computation, its methodology and aspirations, and the unique and fundamental ways in which it has shaped and will further shape science, technology, and society. For further reading, an extensive bibliography is provided for all topics covered. *Mathematics and Computation* is useful for undergraduate and graduate students in mathematics, computer science, and related fields, as well as researchers and teachers in these fields. Many parts require little background, and serve as an invitation to newcomers seeking an introduction to the theory of computation. Comprehensive coverage of computational complexity theory, and beyond. High-level, intuitive exposition, which brings conceptual clarity to this central and dynamic scientific discipline. Historical accounts of the evolution and motivations of central concepts and models. A broad view of the theory of computation's influence on science, technology, and society. Extensive bibliography.

An Introduction to Algebraic Structures - Joseph Landin 2012-08-29

This self-contained text covers sets and numbers, elements of set theory, real numbers, the theory of groups, group isomorphism and homomorphism, theory of rings, and polynomial rings. 1969 edition.

Discrete Mathematics - Jean Gallier 2011-02-01
This book gives an introduction to discrete mathematics for beginning undergraduates. One of the original features of this book is that it begins with a presentation of the rules of logic as used

in mathematics. Many examples of formal and informal proofs are given. With this logical framework firmly in place, the book describes the major axioms of set theory and introduces the natural numbers. The rest of the book is more standard. It deals with functions and relations, directed and undirected graphs, and an introduction to combinatorics. There is a section on public key cryptography and RSA, with complete proofs of Fermat's little theorem and the correctness of the RSA scheme, as well as explicit algorithms to perform modular arithmetic. The last chapter provides more graph theory. Eulerian and Hamiltonian cycles are discussed. Then, we study flows and tensions and state and prove the max flow min-cut theorem. We also discuss matchings, covering, bipartite graphs.

Mathematics for Computer Science - Eric Lehman 2017-03-08

This book covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods; induction, well-ordering; sets, relations; elementary graph theory; integer congruences; asymptotic notation and growth of functions; permutations and combinations, counting principles; discrete probability. Further selected topics may also be covered, such as recursive definition and structural induction; state machines and invariants; recurrences; generating functions.

Foundation Mathematics for Computer Science - John Vince 2015-07-27

John Vince describes a range of mathematical topics to provide a foundation for an

undergraduate course in computer science, starting with a review of number systems and their relevance to digital computers, and finishing with differential and integral calculus. Readers will find that the author's visual approach will greatly improve their understanding as to why certain mathematical structures exist, together with how they are used in real-world applications. Each chapter includes full-colour illustrations to clarify the mathematical descriptions, and in some cases, equations are also coloured to reveal vital algebraic patterns. The numerous worked examples will consolidate comprehension of abstract mathematical concepts. Foundation Mathematics for Computer Science covers number systems, algebra, logic, trigonometry, coordinate systems, determinants, vectors, matrices, geometric matrix transforms, differential and integral calculus, and reveals the names of the mathematicians behind such inventions. During this journey, John Vince touches upon more esoteric topics such as quaternions, octonions, Grassmann algebra, Barycentric coordinates, transfinite sets and prime numbers. Whether you intend to pursue a career in programming, scientific visualisation, systems design, or real-time computing, you should find the author's literary style refreshingly lucid and engaging, and prepare you for more advanced texts.

Open Data Structures - Pat Morin 2013

Introduction -- Array-based lists -- Linked lists -- Skiplists -- Hash tables -- Binary trees -- Random binary search trees -- Scapegoat trees -- Red-black trees -- Heaps -- Sorting algorithms -- Graphs -- Data structures for integers -- External memory searching.