



Number Theory For Computing

R. B. J. T. Allenby, E. J. Redfern



Number Theory For Computing:

Number Theory for Computing Song Y. Yan, 2013-03-09 Mathematicians do not study objects but relations among objects; they are indifferent to the replacement of objects by others as long as relations do not change. Matter is not important; only form interests them. HENRI POINCARÉ 1854-1912 Computer scientists working on algorithms for factorization would be well advised to brush up on their number theory. IAN STEWART 219 The theory of numbers in mathematics is primarily the theory of the properties of integers, i.e. the whole numbers, particularly the positive integers. For example, Euclid proved 2000 years ago in his *Elements* that there exist infinitely many prime numbers. The subject has long been considered as the purest branch of mathematics with very few applications to other areas. However, recent years have seen considerable increase in interest in several central topics of number theory precisely because of their importance and applications in other areas, particularly in computing and information technology.

Number Theory for Computing Song Y. Yan, 2014-01-15 **Number Theory with Computer Applications** Ramanujachary Kumanduri, Cristina Romero, 1998 Appropriate for most courses in Number Theory. This book effectively integrates computing algorithms into the number theory curriculum using a heuristic approach and strong emphasis on proofs. Its in-depth coverage of modern applications considers the latest trends and topics such as elliptic curves, a subject that has seen a rise in popularity due to its use in the proof of Fermat's Last Theorem.

Primes and Programming P. J. Giblin, 1993-09-02 In this introductory book, Dr. Giblin describes methods that have been developed for testing the primality of numbers, provides Pascal programs for their implementation, and gives applications to coding.

Algorithmic Number Theory J. P. Buhler, P. Stevenhagen, 2008-10-20 An introduction to number theory for beginning graduate students with articles by the leading experts in the field. *Number Theory for Computing* Song Y. Yan, 2002-04-24 This book provides a good introduction to the classical elementary number theory and the modern algorithmic number theory and their applications in computing and information technology, including computer systems design, cryptography, and network security. In this second edition, proofs of many theorems have been provided, further additions and corrections were made. **Number Theory in Science and Communication** Manfred Schroeder, 2008-11-06 Number Theory in Science and Communication is a well-known introduction for non-mathematicians to this fascinating and useful branch of applied mathematics. It stresses intuitive understanding rather than abstract theory and highlights important concepts such as continued fractions, the golden ratio, quadratic residues, and Chinese remainders, trapdoor functions, pseudo primes, and primitive elements. Their applications to problems in the real world are one of the main themes of the book. This revised fifth edition is augmented by recent advances in coding theory, permutations, and derangements, and a chapter in quantum cryptography. From reviews of earlier editions, I continue to find Schroeder's *Number Theory* a goldmine of valuable information. It is a marvelous book in touch with the most recent applications of number theory and written with great clarity.

and humor Philip Morrison Scientific American A light hearted and readable volume with a wide range of applications to which the author has been a productive contributor useful mathematics outside the formalities of theorem and proof Martin Gardner

Cryptology and Computational Number Theory Carl Pomerance, Shafi Goldwasser, 1990 In the past dozen or so years cryptology and computational number theory have become increasingly intertwined Because the primary cryptologic application of number theory is the apparent intractability of certain computations these two fields could part in the future and again go their separate ways But for now their union is continuing to bring ferment and rapid change in both subjects This book contains the proceedings of an AMS Short Course in Cryptology and Computational Number Theory held in August 1989 during the Joint Mathematics Meetings in Boulder Colorado These eight papers by six of the top experts in the field will provide readers with a thorough introduction to some of the principal advances in cryptology and computational number theory over the past fifteen years In addition to an extensive introductory article the book contains articles on primality testing discrete logarithms integer factoring knapsack cryptosystems pseudorandom number generators the theoretical underpinnings of cryptology and other number theory based cryptosystems Requiring only background in elementary number theory this book is aimed at nonexperts including graduate students and advanced undergraduates in mathematics and computer science

Introduction to Number Theory with Computing R. B. J. T. Allenby, E. J. Redfern, 1989-01-01 This introduction to number theory has been written specifically for mathematics and computing undergraduates Computer programs in BASIC are accompanied by basic text which explains the subject and demonstrates how computers have opened up new horizons for number theorists

Elementary Number Theory with Programming Marty Lewinter, Jeanine Meyer, 2015-05-06 A highly successful presentation of the fundamental concepts of number theory and computer programming Bridging an existing gap between mathematics and programming Elementary Number Theory with Programming provides a unique introduction to elementary number theory with fundamental coverage of computer programming Written by highly qualified experts in the fields of computer science and mathematics the book features accessible coverage for readers with various levels of experience and explores number theory in the context of programming without relying on advanced prerequisite knowledge and concepts in either area Elementary Number Theory with Programming features comprehensive coverage of the methodology and applications of the most well known theorems problems and concepts in number theory Using standard mathematical applications within the programming field the book presents modular arithmetic and prime decomposition which are the basis of the public private key system of cryptography In addition the book includes Numerous examples exercises and research challenges in each chapter to encourage readers to work through the discussed concepts and ideas Select solutions to the chapter exercises in an appendix Plentiful sample computer programs to aid comprehension of the presented material for readers who have either never done any programming or need to improve their existing skill set A related website with links to select exercises An Instructor s

Solutions Manual available on a companion website Elementary Number Theory with Programming is a useful textbook for undergraduate and graduate level students majoring in mathematics or computer science as well as an excellent supplement for teachers and students who would like to better understand and appreciate number theory and computer programming The book is also an ideal reference for computer scientists programmers and researchers interested in the mathematical applications of programming

Algorithmic Number Theory: Efficient algorithms Eric Bach, Jeffrey Outlaw Shallit, 1996 Volume 1

A Computational Introduction to Number Theory and Algebra Victor Shoup, 2005-04-28 This introductory book emphasises algorithms and applications such as cryptography and error correcting codes

Computational Number Theory and Modern Cryptography Song Y. Yan, 2013-01-29 The only book to provide a unified view of the interplay between computational number theory and cryptography Computational number theory and modern cryptography are two of the most important and fundamental research fields in information security In this book Song Y Yang combines knowledge of these two critical fields providing a unified view of the relationships between computational number theory and cryptography The author takes an innovative approach presenting mathematical ideas first thereupon treating cryptography as an immediate application of the mathematical concepts The book also presents topics from number theory which are relevant for applications in public key cryptography as well as modern topics such as coding and lattice based cryptography for post quantum cryptography The author further covers the current research and applications for common cryptographic algorithms describing the mathematical problems behind these applications in a manner accessible to computer scientists and engineers Makes mathematical problems accessible to computer scientists and engineers by showing their immediate application Presents topics from number theory relevant for public key cryptography applications Covers modern topics such as coding and lattice based cryptography for post quantum cryptography Starts with the basics then goes into applications and areas of active research Geared at a global audience classroom tested in North America Europe and Asia Includes exercises in every chapter Instructor resources available on the book's Companion Website Computational Number Theory and Modern Cryptography is ideal for graduate and advanced undergraduate students in computer science communications engineering cryptography and mathematics Computer scientists practicing cryptographers and other professionals involved in various security schemes will also find this book to be a helpful reference

Primes and Programming, 1993

Finite Fields: Theory and Computation Igor Shparlinski, 2013-03-09 This book is mainly devoted to some computational and algorithmic problems in finite fields such as for example polynomial factorization finding irreducible and primitive polynomials the distribution of these primitive polynomials and of primitive points on elliptic curves constructing bases of various types and new applications of finite fields to other areas of mathematics For completeness we include two special chapters on some recent advances and applications of the theory of congruences optimal coefficients congruential pseudo random number generators modular arithmetic etc and computational number

theory primality testing factoring integers computation in algebraic number theory etc The problems considered here have many applications in Computer Science Coding Theory Cryptography Numerical Methods and so on There are a few books devoted to more general questions but the results contained in this book have not till now been collected under one cover In the present work the author has attempted to point out new links among different areas of the theory of finite fields It contains many very important results which previously could be found only in widely scattered and hardly available conference proceedings and journals In particular we extensively review results which originally appeared only in Russian and are not well known to mathematicians outside the former USSR

Computational Number Theory Abhijit Das, 2016-04-19 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

Primes and Programming P. J. Giblin, 1993 *Number Theory in Science and Communication* M.R. Schroeder, 2005-11-03 Number Theory in Science and Communication introduces non mathematicians to the fascinating and diverse applications of number theory This best selling book stresses intuitive understanding rather than abstract theory This revised fourth edition is augmented by recent advances in primes in progressions twin primes prime triplets prime quadruplets and quintuplets factoring with elliptic curves quantum factoring Golomb rulers and baroque integers

Computers in Number Theory Donald D. Spencer, 1982

This book delves into Number Theory For Computing. Number Theory For Computing is a vital topic that needs to be grasped by everyone, ranging from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Number Theory For Computing, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Number Theory For Computing
 - Chapter 2: Essential Elements of Number Theory For Computing
 - Chapter 3: Number Theory For Computing in Everyday Life
 - Chapter 4: Number Theory For Computing in Specific Contexts
 - Chapter 5: Conclusion
2. In chapter 1, the author will provide an overview of Number Theory For Computing. The first chapter will explore what Number Theory For Computing is, why Number Theory For Computing is vital, and how to effectively learn about Number Theory For Computing.
3. In chapter 2, the author will delve into the foundational concepts of Number Theory For Computing. The second chapter will elucidate the essential principles that must be understood to grasp Number Theory For Computing in its entirety.
4. In chapter 3, this book will examine the practical applications of Number Theory For Computing in daily life. This chapter will showcase real-world examples of how Number Theory For Computing can be effectively utilized in everyday scenarios.
5. In chapter 4, this book will scrutinize the relevance of Number Theory For Computing in specific contexts. This chapter will explore how Number Theory For Computing is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, the author will draw a conclusion about Number Theory For Computing. This chapter will summarize the key points that have been discussed throughout the book.

The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Number Theory For Computing.

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