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An Introduction American Mathematical Soc.
A description of 148 algorithms fundamental to number-theoretic computations, in particular for computations related to algebraic number theory, elliptic curves, primality testing and factoring. The first seven chapters guide readers to the heart of current research in computational algebraic number theory, including recent algorithms for computing class groups and units, as well as elliptic curve computations, while the last three chapters survey factoring and primality testing methods, including a detailed description of the number field sieve algorithm. The whole is rounded off with a description of available computer packages and some useful tables, backed by numerous exercises. Written by an authority in the field, and one with great practical and teaching experience, this is certain to become the standard and indispensable reference on the subject.

Analytic Number Theory Springer Science & Business Media
Gathered from the 2016 Gainesville Number Theory Conference honoring Krishna Alladi on his 60th birthday, these proceedings present recent research in number theory. Extensive and detailed, this volume features 40 articles by leading researchers on topics in analytic number theory, probabilistic number theory, irrationality and transcendence, Diophantine analysis, partitions, basic hypergeometric series, and modular forms. Readers will also find detailed discussions of several aspects of the path-breaking work of Srinivasa Ramanujan and its influence on current research. Many of the papers were motivated by Alladi's own research on partitions and q-series as well as his earlier work in number theory. Alladi is well known for his

contributions in number theory and mathematics. His research interests include combinatorics, discrete mathematics, sieve methods, probabilistic and analytic number theory, Diophantine approximations, partitions and q-series identities. Graduate students and researchers will find this volume a valuable resource on new developments in various aspects of number theory.

Introduction to the Theory of Analytic Spaces Springer

Introduction to Analytic Number TheorySpringer Science & Business Media

Abstract analytic number theory Springer

This volume contains a collection of research and survey papers written by some of the most eminent mathematicians in the international community and is dedicated to Helmut Maier, whose own research has been groundbreaking and deeply influential to the field. Specific emphasis is given to topics regarding exponential and trigonometric sums and their behavior in short intervals, anatomy of integers and cyclotomic polynomials, small gaps in sequences of sifted prime numbers, oscillation theorems for primes in arithmetic progressions, inequalities related to the distribution of primes in short intervals, the Möbius function, Euler's totient function, the Riemann zeta function and the Riemann Hypothesis. Graduate students, research mathematicians, as well as computer scientists and engineers who are interested in pure and interdisciplinary research, will find this volume a useful resource. Contributors to this volume: Bill Allombert, Levent Alpoge, Nadine Amersi, Yuri Bilu, Régis de la Bretèche, Christian Elsholtz, John B. Friedlander, Kevin Ford, Daniel A. Goldston, Steven M. Gonek, Andrew Granville, Adam J. Harper, Glyn Harman, D. R. Heath-Brown, Aleksandar Ivić, Geoffrey Iyer, Jerzy Kaczorowski, Daniel M. Kane, Sergei Konyagin, Dimitris Koukoulopoulos, Michel L. Lapidus, Oleg Lazarev, Andrew H. Ledoan, Robert J. Lemke Oliver, Florian Luca, James Maynard, Steven J. Miller, Hugh L. Montgomery, Melvyn B. Nathanson, Ashkan Nikeghbali, Alberto Perelli, Amalia Pizarro-Madariaga, János Pintz, Paul Pollack, Carl Pomerance, Michael Th. Rassias, Maksym Radziwiłł, Joël Rivat, András Sárközy, Jeffrey Shallit, Terence Tao, Gérald Tenenbaum, László Tóth, Tamar Ziegler, Liyang Zhang.

Exploring the Anatomy of Integers **Cambridge University Press**

Knopp's engaging book presents an introduction to modular functions in number theory by concentrating on two modular functions, $\eta(\tau)$ and $\vartheta(\tau)$, and their applications to two number-theoretic functions, $p(n)$ and $r_s(n)$. They are well chosen, as at the heart of these particular applications to the treatment of these specific number-theoretic functions lies the general theory of automorphic functions, a theory of far-reaching significance with important connections to a great many fields of mathematics. The book is essentially self-contained, assuming only a good first-year course in analysis. The excellent exposition presents the beautiful interplay between modular forms and number theory, making the book an excellent introduction to analytic number theory for a beginning graduate student. Table of Contents: The Modular Group and Certain Subgroups: 1. The modular group; 2. A fundamental region for $\Gamma(1)$; 3. Some subgroups of $\Gamma(1)$; 4. Fundamental regions of subgroups. Modular Functions and Forms: 1. Multiplier systems; 2. Parabolic points; 3 Fourier

expansions; 4. Definitions of modular function and modular form; 5. Several important theorems.The Modular Forms $\eta(\tau)$ and $\vartheta(\tau)$: 1. The function $\eta(\tau)$; 2. Several famous identities; 3. Transformation formulas for $\eta(\tau)$; 4. The function $\vartheta(\tau)$. The Multiplier Systems υ_{η} and υ_{ϑ}: 1. Preliminaries; 2. Proof of theorem 2; 3. Proof of theorem 3. Sums of Squares: 1. Statement of results; 2. Lipschitz summation formula; 3. The function $\psi_s(\tau)$; 4. The expansion of $\psi_s(\tau)$ at -1; 5. Proofs of theorems 2 and 3; 6. Related results. The Order of Magnitude of $p(n)$: 1. A simple inequality for $p(n)$; 2. The asymptotic formula for $p(n)$; 3. Proof of theorem 2. The Ramanujan Congruences for $p(n)$: 1. Statement of the congruences; 2. The functions $\Phi_{p, r}(\tau)$ and $h_p(\tau)$; 3. The function $s_{p, r}(\tau)$; 4. The congruence for $p(n)$ Modulo 11; 5. Newton's formula; 6. The modular equation for the prime 5; 7. The modular equation for the prime 7. Proof of the Ramanujan Congruences for Powers of 5 and 7: 1. Preliminaries; 2. Application of the modular equation; 3. A digression: The Ramanujan identities for powers of the prime 5; 4. Completion of the proof for powers of 5; 5.Start of the proof for powers of 7; 6. A second digression: The Ramanujan identities for powers of the prime 7; 7. Completion of the proof for powers of 7. Index. (CHEL/337.H

A Classical Introduction to Modern Number Theory Newnes

This book is divided into five chapters: I. Dirichlet's theorem on primes in an arithmetic progression; II. Distribution of primes; III. The theory of partitions; IV. Waring's problem; V. Dirichlet L-functions and class number of quadratic fields.

Modular Functions in Analytic Number Theory Springer Science & Business Media

This book, in honor of Hari M. Srivastava, discusses essential developments in mathematical research in a variety of problems. It contains thirty-five articles, written by eminent scientists from the international mathematical community, including both research and survey works. Subjects covered include analytic number theory, combinatorics, special sequences of numbers and polynomials, analytic inequalities and applications, approximation of functions and quadratures, orthogonality and special and complex functions. The mathematical results and open problems discussed in this book are presented in a simple and self-contained manner. The book contains an overview of old and new results, methods, and theories toward the solution of longstanding problems in a wide scientific field, as well as new results in rapidly progressing areas of research. The book will be useful for researchers and graduate students in the fields of mathematics, physics and other computational and applied sciences.

Analytic Number Theory American Mathematical Soc.

This English translation of Karatsuba's Basic Analytic Number Theory follows closely the second Russian edition, published in Moscow in 1983. For the English edition, the author has considerably rewritten Chapter I, and has corrected various typographical and other minor errors throughout the the text. August, 1991 Melvyn B. Nathanson Introduction to the English Edition It gives me great pleasure that Springer-Verlag is publishing an English trans lation of my book. In the Soviet Union, the primary purpose of this monograph was to introduce mathematicians to the basic results and methods of analytic number theory, but the book has also been increasingly used as a textbook by graduate students in many different fields of mathematics. I hope that the English edition will be used in the same ways. I express my deep gratitude to Professor Melvyn B. Nathanson for his excellent translation and for much assistance in correcting errors in the original text.

A.A. Karatsuba Introduction to the Second Russian Edition Number theory is the study of the properties of the integers. Analytic number theory is that part of number theory in which, besides purely number theoretic arguments, the methods of mathematical analysis play an essential role.

A Brief Guide to Algebraic Number Theory Springer Science & Business Media

Broad graduate-level account of Algebraic Number Theory, including exercises, by a world-renowned author.

Introduction to p-adic Analytic Number Theory Springer Science & Business Media

This book is divided into two parts. The first one is purely algebraic. Its objective is the classification of quadratic forms over the field of rational numbers (Hasse-Minkowski theorem). It is achieved in Chapter IV. The first three chapters contain some preliminaries: quadratic reciprocity law, p-adic fields, Hilbert symbols. Chapter V applies the preceding results to integral quadratic forms of discriminant ± I. These forms occur in various questions: modular functions, differential topology, finite groups. The second part (Chapters VI and VII) uses "analytic" methods (holomor phic functions). Chapter VI gives the proof of the "theorem on arithmetic progressions" due to Dirichlet; this theorem is used at a critical point in the first part (Chapter Ill, no. 2.2). Chapter VII deals with modular forms, and in particular, with theta functions. Some of the quadratic forms of Chapter V reappear here. The two parts correspond to lectures given in 1962 and 1964 to second year students at the Ecole Normale Superieure. A redaction of these lectures in the form of duplicated notes, was made by J.-J. Sansuc (Chapters I-IV) and J.-P. Ramis and G. Ruget (Chapters VI-VII). They were very useful to me; I extend here my gratitude to their authors.

Analytic and Elementary Number Theory American Mathematical Soc.

Number Theory is more than a comprehensive treatment of the subject. It is an introduction to topics in higher level mathematics, and unique in its scope; topics from analysis, modern algebra, and discrete mathematics are all included. The book is divided into two parts. Part A covers key concepts of number theory and could serve as a first course on the subject. Part B delves into more advanced topics and an exploration of related mathematics. The prerequisites for this self-contained text are elements from linear algebra. Valuable references for the reader are collected at the end of each chapter. It is suitable as an introduction to higher level mathematics for undergraduates, or for self-study.

Problems in Analytic Number Theory Springer Science & Business Media

This volume contains a collection of papers in Analytic and Elementary Number Theory in memory of Professor Paul Erd ö s, one of the greatest mathematicians of this century. Written by many leading researchers, the papers deal with the most recent advances in a wide variety of topics, including arithmetical functions, prime numbers, the Riemann zeta function, probabilistic number theory, properties of integer sequences, modular forms, partitions, and q-series. Audience: Researchers and students of number theory, analysis, combinatorics and modular forms will find this volume to be stimulating.

Topics in Analytic Number Theory American Mathematical Soc.

This book is a revised and greatly expanded version of our book Elements of Number Theory published in 1972. As with the first book the primary audience we envisage consists of upper level undergraduate mathematics majors and graduate students. We have assumed some familiarity with the material in a standard undergraduate course in abstract algebra. A large portion of Chapters 1-11 can be read even without such background with the aid of a small amount of supplementary reading. The later chapters assume some knowledge of Galois theory, and in Chapters 16 and 18 an acquaintance with the theory of complex variables is necessary. Number theory is an ancient subject and its content is vast. Any intro ductory book must, of necessity, make a very limited selection from the fascinat ing array of possible topics. Our focus is on topics which point in the direction of algebraic number theory and arithmetic algebraic geometry. By a careful selection of subject matter we have found it possible to exposit some rather advanced material without requiring very much in the way oftechnical background. Most of this material is classical in the sense that is was dis covered during the nineteenth century and earlier, but it is also modern because it is intimately related to important research going on at the present time.

In Honor of Krishna Alladi's 60th Birthday, University of Florida, Gainesville, March 2016 Springer Science & Business Media

This is a book about prime numbers, congruences, secret messages, and elliptic curves that you can read cover to cover. It grew out of undergr- uate courses that the author taught at Harvard, UC San Diego, and the University of Washington. The systematic study of number theory was initiated around 300B. C. when Euclid proved that there are in?nitely many prime numbers, and also cleverly deduced the fundamental theorem of arithmetic, which asserts that every positive integer factors uniquely as a product of primes. Over a thousand years later (around 972A. D.) Arab mathematicians formulated the congruent number problem that asks for a way to decide whether or not a given positive integer n is the area of a right triangle, all three of whose sides are rational numbers. Then another thousand years later (in 1976), Di?e and Hellman introduced the ?rst ever public-key cryptosystem, which enabled two people to communicate secretely over a public communications channel with no predetermined secret; this invention and the ones that followed it revolutionized the world of digital communication. In the 1980s and 1990s, elliptic curves revolutionized number theory, providing striking new insights into the congruent number problem, primality testing, publ- key cryptography, attacks on public-key systems, and playing a central role in Andrew Wiles ' resolution of Fermat ' s Last Theorem.

Introduction to Analytic Number Theory Springer Science & Business Media

"In order to become proficient in mathematics, or in any subject," writes Andre Weil, "the student must realize that most topics in volve only a small number of basic ideas. " After learning these basic concepts and theorems, the student should "drill in routine exercises, by which the necessary reflexes in handling such concepts may be ac quired. . . . There can be no real understanding of the basic concepts of a mathematical theory without an ability to use them intelligently and apply them to specific problems. " Weil's insightfulobservation becomes especially important at the graduate and research level. It is the viewpoint of this book. Our goal is to acquaint the student with the methods of analytic number theory as rapidly as possible through examples and exercises. Any landmark theorem opens up a method of attacking other problems. Unless the student is able to sift out from the mass of theory the underlying techniques, his or her understanding will only be academic and not that of a participant in research. The prime number theorem has given rise to the rich Tauberian theory and a general method of Dirichlet series with which one can study the asymptotics of sequences. It has also motivated the development of sieve methods. We focus on this theme in the book. We also touch upon the emerging Selberg theory (in Chapter 8) and p-adic analytic number theory (in Chapter 10).

Introduction to Analytic Number Theory American Mathematical Soc.
Some of the central topics in number theory, presnted in a simple and concise fashion. The author covers an amazing amount of material, despite a leisurely pace and emphasis on readability. His heartfelt enthusiasm enables readers to see what is magical about the subject. All the topics are presented in a refreshingly elegant and efficient manner with clever examples and interesting problems throughout. The text is suitable for a graduate course in analytic number theory.

Modular Functions and Dirichlet Series in Number Theory Springer Nature
This book is an introduction to analytic number theory suitable for beginning graduate students. It covers everything one expects in a first course in this field, such as growth of arithmetic functions, existence of primes in arithmetic progressions, and the Prime Number Theorem. But it also covers more challenging topics that might be used in a second course, such as the Siegel-Walfisz theorem, functional equations of L-functions, and the explicit formula of von Mangoldt. For students with an interest in Diophantine analysis, there is a chapter on the Circle Method and Waring's Problem. Those with an interest in algebraic number theory may find the chapter on the analytic theory of number fields of interest, with proofs of the Dirichlet unit theorem, the analytic class number formula, the functional equation of the Dedekind zeta function, and the Prime Ideal Theorem. The exposition is both clear and precise, reflecting careful attention to the needs of the reader. The text includes extensive historical notes, which occur at the ends of the chapters. The exercises range from introductory problems and standard problems in analytic number theory to interesting original problems that will challenge the reader. The author has made an effort to provide clear explanations for the techniques of analysis used. No background in analysis beyond rigorous calculus and a first course in complex function theory is assumed.

Analytic Number Theory Springer Science & Business Media
At the time of Professor Rademacher's death early in 1969, there was available a complete manuscript of the present work. The editors had only to supply a few bibliographical references and to correct a few misprints and errors. No substantive changes were made in the manu script except in one or two places where references to additional material appeared; since this material was not found in Rademacher's papers, these references were deleted. The editors are grateful to Springer-Verlag for their helpfulness and courtesy. Rademacher started work on the present volume no later than 1944; he was still working on it at the inception of his final illness. It represents the parts of analytic number theory that were of greatest interest to him. The editors, his students, offer this work as homage to the memory of a great man to whom they, in common with all number theorists, owe a deep and lasting debt. E. Grosswald Temple University, Philadelphia, PA 19122, U.S.A. J. Lehner University of Pittsburgh, Pittsburgh, PA 15213 and National Bureau of Standards, Washington, DC 20234, U.S.A. M. Newman National Bureau of Standards, Washington, DC 20234, U.S.A. Contents

.... 10 6. A multiplication formula for the Bernoulli polynomials ....

The Princeton Companion to Mathematics Cambridge University Press

This problem book gathers together 15 problem sets on analytic number theory that can be profitably approached by anyone from advanced high school students to those pursuing graduate studies. It emerged from a 5-week course taught by the first author as part of the 2019 Ross/Asia Mathematics Program held from July 7 to August 9 in Zhenjiang, China. While it is recommended that the reader has a solid background in mathematical problem solving (as from training for mathematical contests), no possession of advanced subject-matter knowledge is assumed. Most of the solutions require nothing more than elementary number theory and a good grasp of calculus. Problems touch at key topics like the value-distribution of arithmetic functions, the distribution of prime numbers, the distribution of squares and nonsquares modulo a prime number, Dirichlet's theorem on primes in arithmetic progressions, and more. This book is suitable for any student with a special interest in developing problem-solving skills in analytic number theory. It will be an invaluable aid to lecturers and students as a supplementary text for introductory Analytic Number Theory courses at both the undergraduate and graduate level.

American Mathematical Soc.

This is a one-of-a-kind reference for anyone with a serious interest in mathematics. Edited by Timothy Gowers, a recipient of the Fields Medal, it presents nearly two hundred entries, written especially for this book by some of the world's leading mathematicians, that introduce basic mathematical tools and vocabulary; trace the development of modern mathematics; explain essential terms and concepts; examine core ideas in major areas of mathematics; describe the achievements of scores of famous mathematicians; explore the impact of mathematics on other disciplines such as biology, finance, and music--and much, much more. Unparalleled in its depth of coverage, The Princeton Companion to Mathematics surveys the most active and exciting branches of pure mathematics. Accessible in style, this is an indispensable resource for undergraduate and graduate students in mathematics as well as for researchers and scholars seeking to understand areas outside their specialties. Features nearly 200 entries, organized thematically and written by an international team of distinguished contributors Presents major ideas and branches of pure mathematics in a clear, accessible style Defines and explains important mathematical concepts, methods, theorems, and open problems Introduces the language of mathematics and the goals of mathematical research Covers number theory, algebra, analysis, geometry, logic, probability, and more Traces the history and development of modern mathematics Profiles more than ninety-five mathematicians who influenced those working today Explores the influence of mathematics on other disciplines Includes bibliographies, cross-references, and a comprehensive index Contributors incude: Graham Allan, Noga Alon, George Andrews, Tom Archibald, Sir Michael Atiyah, David Aubin, Joan Bagaria, Keith Ball, June Barrow-Green, Alan Beardon, David D. Ben-Zvi, Vitaly Bergelson, Nicholas Bingham, B é la Bollob á s, Henk Bos, Bodil Branner, Martin R. Bridson, John P. Burgess, Kevin Buzzard, Peter J. Cameron, Jean-Luc Chabert, Eugenia Cheng, Clifford C. Cocks, Alain Connes, Leo Corry, Wolfgang Coy, Tony Crilly, Serafina Cuomo, Mihalis Dafermos, Partha Dasgupta, Ingrid Daubechies, Joseph W. Dauben, John W. Dawson Jr., Francois de Gandt, Persi Diaconis, Jordan S. Ellenberg, Lawrence C. Evans, Florence Fasanelli, Anita Burdman Feferman, Solomon Feferman, Charles Fefferman, Della Fenster, Jos é Ferreir ó s, David Fisher, Terry Gannon, A. Gardiner, Charles C. Gillispie, Oded Goldreich, Catherine Goldstein, Fernando Q. Gouv ê a, Timothy Gowers, Andrew Granville, Ivor Grattan-Guinness, Jeremy Gray, Ben Green, Ian

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