Development Of Prime Number Theory From Euclid To Hardy And Littlewood

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Development Of Prime Number Theory From Euclid To Hardy And Littlewood ***2020-10-16***

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From PNT to FLT Springer Science & Business Media
This book is written for the student in mathematics. Its goal is to give a view of the theory of numbers, of the problems with which this theory deals, and of the methods that are used. We have avoided that style which gives a systematic development of the apparatus and have used instead a freer style, in which the problems and the methods of solution are closely interwoven. We start from concrete problems in number theory. General theories arise as tools for solving these problems. As a rule, these theories are developed sufficiently far so that the reader can see for himself their strength and beauty, and so that he learns to apply them. Most of the questions that are examined in this book are connected with the theory of diophantine equations - that is, with the theory of the solutions in integers of equations in several variables. However, we also consider questions of other types; for example, we derive the theorem of Dirichlet on prime numbers in arithmetic progressions and investigate the growth of the number of solutions of congruences.
Introduction to Analytic Number Theory Springer Science & Business Media
First published in 1979 and written by two distinguished mathematicians with a special gift for exposition, this book is now available in a completely revised third edition. It reflects the exciting developments in number theory during the past two decades that culminated in the proof of Fermat's Last Theorem. Intended as a upper level textbook, it
Number Theory Cambridge University Press
Carl Friedrich Gauss’s textbook, Disquisitiones arithmeticae, published in 1801 (Latin), remains to this day a true masterpiece of mathematical examination. .
With Combinatorics and Graph Theory Courier Corporation
Unusually clear, accessible introduction covers counting, properties of numbers, prime numbers, Aliquot parts, Diophantine problems, congruences, much more. Bibliography.
How Mathematics Happened World Scientific
This definitive synthesis of mathematician Gregory Margulis’s research brings together leading experts to cover the breadth and diversity of disciplines Margulis’s work touches upon. This edited collection highlights the foundations and evolution of research by widely influential Fields Medalist Gregory Margulis. Margulis is unusual in the degree to which his solutions to particular problems have opened new vistas of mathematics; his ideas were central, for example, to developments that led to the recent Fields Medals of Elon Lindenstrauss and Maryam Mirzhakhani. Dynamics, Geometry, Number Theory introduces these areas, their development, their use in current research, and the connections between them. Divided into four broad sections—“Arithmeticity, Superrigidity, Normal Subgroups”; “Discrete Subgroups”; “Expanders, Representations, Spectral Theory”; and “Homogeneous Dynamics”—the chapters have all been written by the foremost experts on each topic with a view to making them accessible both to graduate students and to experts in other parts of mathematics. This was no simple feat: Margulis’s work stands out in part because of its depth, but also because it brings together ideas from different areas of mathematics. Few can be experts in all of these fields, and this diversity of ideas can make it challenging to enter Margulis’s area of research. Dynamics, Geometry, Number Theory provides one remedy to that challenge.
Disquisitiones Arithmeticae Prometheus Books
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.
Multiplicative Number Theory I Oxford University Press
This edition has been called ‘startlingly up-to-date’, and in this corrected second printing you can be sure that it’s even more contemporaneous. It surveys from a unified point of view both the modern state and the trends of continuing development in various branches of number theory. Illuminated by elementary problems, the central ideas of modern theories are laid bare. Some topics covered

include non-Abelian generalizations of class field theory, recursive computability and Diophantine equations, zeta- and L-functions. This substantially revised and expanded new edition contains several new sections, such as Wiles' proof of Fermat's Last Theorem, and relevant techniques coming from a synthesis of various theories.

Third Edition Tata McGraw-Hill Education

Solutions of equations in integers is the central problem of number theory and is the focus of this book. The amount of material is suitable for a one-semester course. The author has tried to avoid the ad hoc proofs in favor of unifying ideas that work in many situations. There are exercises at the end of almost every section, so that each new idea or proof receives immediate reinforcement.

Introduction to Modern Number Theory Cambridge University Press

The number field sieve is an algorithm for finding the prime factors of large integers. It depends on algebraic number theory. Proposed by John Pollard in 1988, the method was used in 1990 to factor the ninth Fermat number, a 155-digit integer. The algorithm is most suited to numbers of a special form, but there is a promising variant that applies in general. This volume contains six research papers that describe the operation of the number field sieve, from both theoretical and practical perspectives. Pollard's original manuscript is included. In addition, there is an annotated bibliography of directly related literature.

Elementary Number Theory: Primes, Congruences, and Secrets Cambridge University Press

At first glance the prime numbers appear to be distributed in a very irregular way amongst the integers, but it is possible to produce a simple formula that tells us (in an approximate but well defined sense) how many primes we can expect to find that are less than any integer we might choose. The prime number theorem tells us what this formula is and it is indisputably one of the great classical theorems of mathematics. This textbook gives an introduction to the prime number theorem suitable for advanced undergraduates and beginning graduate students. The author's aim is to show the reader how the tools of analysis can be used in number theory to attack a 'real' problem, and it is based on his own experiences of teaching this material.

Number Theory Springer

The last one hundred years have seen many important achievements in the classical part of number theory. After the proof of the Prime Number Theorem in 1896, a quick development of analytical tools led to the invention of various new methods, like Brun's sieve method and the circle method of Hardy, Littlewood and Ramanujan; developments in topics such as prime and additive number theory, and the solution of Fermat’s problem. Rational Number Theory in the 20th Century: From PNT to FLT offers a short survey of 20th century developments in classical number theory, documenting between the proof of the Prime Number Theorem and the proof of Fermat's Last Theorem. The focus lays upon the part of number theory that deals with properties of integers and rational numbers. Chapters are divided into five time periods, which are then further divided into subject areas. With the introduction of each new topic, developments are followed through to the present day. This book will appeal to graduate researchers and student in number theory, however the presentation of main results without technicalities will make this accessible to anyone with an interest in the area.

Historic Development of Prime Numbers Springer Science & Business Media

The Indian National Science Academy on the occasion ofthe Golden Jubilee Celebration (Fifty years of India's Independence) decided to publish a number of monographs on the selected fields. The editorial board of INS A invited us to prepare a special monograph in Number Theory. In reponse to this assignment, we invited several eminent Number Theorists to contribute expository/research articles for this monograph on Number Theory. Al though some ofthose invited, due to other preoccupations-could not respond positively to our invitation, we did receive fairly encouraging response from many eminent and creative number theorists throughout the world. These articles are presented herewith in a logical order. We are grateful to all those mathematicians who have sent us their articles. We hope that this monograph will have a significant impact on further development in this subject. R. P. Bambah v. C. Dumir R. J. Hans-Gill A Centennial History of the Prime Number Theorem Tom M. Apostol The Prime Number Theorem Among the thousands of discoveries made by mathematicians over the centuries, some stand out as significant landmarks. One of these is the prime number theorem, which describes the asymptotic distribution of prime numbers. It can be stated in various equivalent forms, two of which are: x (I) K(X) '" -I - as x --+ 00, ogx and Pn '" n log n as n --+ 00. (2) In (1), K(X) denotes the number of primes P ::s x for any x > O.

Elements of Number Theory CRC Press

Have you ever wondered about the explicit formulas in analytic number theory? This short book provides a streamlined and rigorous approach to the explicit formulas of Riemann and von Mangoldt. The race between the prime counting function and the logarithmic integral forms a motivating thread through the narrative, which emphasizes the interplay between the oscillatory terms in the Riemann formula and the Skewes number, the least number for which the prime number theorem undercounts the number of primes. Throughout the book, there are scholarly references to the pioneering work of Euler. The book includes a proof of the prime number theorem and outlines a proof of Littlewood's oscillation theorem before finishing with the current best numerical upper bounds on the Skewes number. This book is a unique text that provides all the mathematical background for understanding the Skewes number. Many exercises are included, with hints for solutions. This book is suitable for anyone with a first course in complex analysis. Its engaging style and invigorating point of view will make refreshing reading for advanced undergraduates through research mathematicians.

Additive Theory of Prime Numbers Springer Science & Business Media

News about this title: — Author Marty Weissman has been awarded a Guggenheim Fellowship for 2020. (Learn more here.) — Selected as a 2018 CHOICE Outstanding Academic Title — 2018 PROSE Awards Honorable Mention An Illustrated Theory of Numbers gives a comprehensive introduction to number theory, with complete proofs, worked examples, and exercises. Its exposition reflects the most recent scholarship in mathematics and its history. Almost 500 sharp illustrations accompany elegant proofs, from prime decomposition through quadratic reciprocity. Geometric and dynamical arguments provide new insights, and allow for a rigorous approach with less algebraic manipulation. The final chapters contain an extended treatment of binary quadratic forms, using Conway's topograph to solve quadratic Diophantine equations (e.g., Pell's equation) and to study reduction and the finiteness of class numbers. Data visualizations introduce the reader to open questions and cutting-edge results in analytic number theory such as the Riemann hypothesis, boundedness of prime gaps, and the class number 1 problem. Accompanying each chapter, historical notes curate primary sources and secondary scholarship to trace the development of number theory within and outside the Western tradition. Requiring only high school algebra and geometry, this text is recommended for a first course in elementary number theory. It is also suitable for mathematicians seeking a fresh perspective on an ancient subject.

A Computational Approach Springer

Loo-Keng Hua was a master mathematician, best known for his work using analytic methods in number theory. In particular, Hua is remembered for his contributions to Waring's Problem and his estimates of trigonometric sums. Additive Theory of Prime Numbers is an exposition of the classic methods as well as Hua's own techniques, many of which have now also become classic. An essential starting point is Vinogradov's mean-value theorem for trigonometric sums, which Hua usefully rephrases and improves. Hua states a generalized version of the Waring-Goldbach problem and gives asymptotic formulas for the number of solutions in Waring's Problem when the monomial x^k is replaced by an arbitrary polynomial of degree k. The book is an excellent entry point for readers interested in additive number theory. It will also be of value to those interested in the development of the now classic methods of the subject.

Dynamics, Geometry, Number Theory Springer Science & Business Media

Originally published in 1934, this volume presents the theory of the distribution of the prime numbers in the series of natural numbers. Despite being long out of print, it remains unsurpassed as an introduction to the field.

A Historical Approach Springer

This text is a rigorous introduction to ergodic theory, developing the machinery of conditional measures and expectations, mixing, and recurrence. Beginning by developing the basics of ergodic theory and progressing to describe some recent applications to number theory, this book goes beyond the standard texts in this topic. Applications include Weyl's polynomial equidistribution theorem, the ergodic proof of Szemeredi's theorem, the connection between the continued fraction map and the modular surface, and a proof of the equidistribution of horocycle orbits. Ergodic Theory with a view towards Number Theory will appeal to mathematicians with some standard background in measure theory and functional analysis. No background in ergodic theory or Lie theory is assumed, and a number of exercises and hints to problems are included, making this the perfect companion for graduate students and researchers in ergodic theory, homogenous dynamics or number theory.

Number Theory American Mathematical Soc.

The aim of this book is to familiarize the reader with fundamental topics in number theory: theory of divisibility, arithmetrical functions, prime numbers, geometry of numbers, additive number theory, probabilistic number theory, theory of Diophantine approximations and algebraic number theory. The author tries to show the connection between number theory and other branches of mathematics with the resultant tools adopted in the book ranging from algebra to probability theory, but without exceeding the undergraduate students who wish to be acquainted with number theory, graduate students intending to specialize in this field and researchers requiring the present state of knowledge.

Fundamental Problems, Ideas and Theories Springer Science & Business Media

This 1952 book attempts to prove the Vinogradov-Goldbach theorem: that every sufficiently large odd number is the sum of three primes.

From Euclid to Hardy and Littlewood Birkhäuser

Early in the development of number theory, it was noticed that the ring of integers has many properties in common with the ring of polynomials over a finite field. The first part of this book illustrates this relationship by presenting analogues of various theorems. The later chapters probe the analogy between global function fields and algebraic number fields. Topics include the ABC-conjecture, Brumer-Stark conjecture, and Drinfeld modules.