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Analysis I World Scientific Publishing Company
An undergraduate-level introduction to number theory, with the emphasis on fully explained proofs and examples. Exercises, together with their solutions are integrated into the text, and the first few chapters assume only basic school algebra. Elementary ideas about groups and rings are then used to study groups of units, quadratic residues and arithmetic functions with applications to enumeration and cryptography. The final part, suitable for third-year students, uses ideas from algebra, analysis, calculus and geometry to study Dirichlet series and sums of squares. In particular, the last chapter gives a concise account of Fermat's Last

Theorem, from its origin in the ancient Babylonian and Greek study of Pythagorean triples to its recent proof by Andrew Wiles.

???? McGraw-Hill Publishing Company

An undergraduate-level 2003 introduction whose only prerequisite is a standard calculus course.

The Distribution of Prime Numbers

Princeton University Press

The third edition of this well known text continues to provide a solid foundation in mathematical analysis for undergraduate and first-year graduate students. The text begins with a discussion of the real number system as a complete ordered field. (Dedekind's construction is now treated in an appendix to Chapter I.) The topological background needed for the development of convergence, continuity, differentiation and integration is provided in Chapter 2. There is a new section on the gamma function, and many new and interesting exercises are included. This text is part of the Walter Rudin Student Series in Advanced Mathematics.

Elementary 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.

A Problem Book in Real Analysis

Springer Science & Business Media

This undergraduate textbook provides an elegant introduction to the arithmetic of quadratic

number fields, including many topics not usually covered in books at this level. Quadratic fields offer an introduction to algebraic number theory and some of its central objects: rings of integers, the unit group, ideals and the ideal class group. This textbook provides solid grounding for further study by placing the subject within the greater context of modern algebraic number theory. Going beyond what is usually covered at this level, the book introduces the notion of modularity in the context of quadratic reciprocity, explores the close links between number theory and geometry via Pell conics, and presents applications to Diophantine equations such as the Fermat and Catalan equations as well as elliptic curves. Throughout, the book contains extensive historical comments, numerous exercises (with solutions), and pointers to further study. Assuming a moderate background in elementary number theory and abstract algebra, Quadratic Number Fields offers an engaging first course in algebraic number theory, suitable for upper undergraduate students. Introduction to

Modular Forms Springer Science & Business Media The theory of elliptic curves involves a blend of algebra, geometry, analysis, and number theory. This book stresses this interplay as it develops the basic theory, providing an opportunity for readers to appreciate the unity of modern mathematics. The book ' s accessibility, the informal writing style, and a wealth of exercises make it an ideal introduction for those interested in learning about Diophantine equations and arithmetic geometry. **Understanding Analysis** Cambridge University Press In a manner accessible to beginning undergraduates, An Invitation to Modern Number Theory introduces many of the central problems, conjectures, results, and techniques of the field, such as the Riemann Hypothesis, Roth's Theorem, the Circle Method, and Random Matrix Theory. Showing how experiments are used to test conjectures and prove theorems, the book allows students to do original work on such problems, often using little more than calculus (though there are numerous remarks for those with deeper backgrounds). It shows students what number theory theorems are used for and what led to them and suggests problems for further research. Steven Miller and Ramin Takloo-Bighash introduce the problems and the computational skills required to numerically investigate them, providing background material (from probability to statistics to Fourier analysis) whenever

necessary. They guide students through a variety of problems, ranging from basic number theory, cryptography, and Goldbach's Problem, to the algebraic structures of numbers and continued fractions, showing connections between these subjects and encouraging students to study them further. In addition, this is the first undergraduate book to explore Random Matrix Theory, which has recently become a powerful tool for predicting answers in number theory. Providing exercises, references to the background literature, and Web links to previous student research projects, An Invitation to Modern Number Theory can be used to teach a research seminar or a lecture class.

An Introductory Course in Elementary Number Theory

Cambridge University Press

An authorised reissue of the long out of print classic textbook, Advanced Calculus by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades.This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in

advanced calculus, or as a text for a three-semester introduction to analysis.The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention Differential and Integral Calculus by R Courant, Calculus by T Apostol, Calculus by M Spivak, and Pure Mathematics by G Hardy. The reader should also have some experience with partial derivatives.In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

Principles of Mathematical Analysis The Saylor Foundation

"This book is the first volume of a two-volume textbook for undergraduates and is indeed the crystallization of a course offered by the author at the California Institute of Technology to undergraduates without any previous knowledge of number theory. For this reason, the book starts with the most elementary properties of the natural integers. Nevertheless, the text succeeds in presenting an enormous amount of material in little more than 300 p ages."-—MATHEMATICAL REVIEWS

Elementary Number Theory with Applications World Scientific Publishing Company 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.

Not Always Buried Deep

Springer Science & Business Media

This is a self-contained introduction to analytic methods in number theory, assuming on the part of the reader only what is typically learned in a standard undergraduate degree course. It offers to students and those beginning research a systematic and consistent account of the subject but will also be a convenient resource and reference for more experienced mathematicians. These aspects are aided by the inclusion at the end of each chapter a section of bibliographic notes and detailed exercises.

Excursions in Number Theory

Cambridge University Press

Challenging, accessible mathematical adventures involving prime numbers, number patterns, irrationals and iterations, calculating prodigies, and

more. No special training is needed, just high school mathematics and an inquisitive mind. "A splendidly written, well selected and presented collection. I recommend the book unreservedly to all readers." — Martin Gardner.

Quadratic Number Fields

Springer Science & Business Media

This is part one of a two-volume book on real analysis and is intended for senior undergraduate students of mathematics who have already been exposed to calculus. The emphasis is on rigour and foundations of analysis. Beginning with the construction of the number systems and set theory, the book discusses the basics of analysis (limits, series, continuity, differentiation, Riemann integration), through to power series, several variable calculus and Fourier analysis, and then finally the Lebesgue integral. These are almost entirely set in the concrete setting of the real line and Euclidean spaces, although there is some material on abstract metric and topological spaces. The book also has appendices on mathematical logic and the decimal system. The entire text (omitting some less central topics) can be taught in two quarters of 25 – 30 lectures each. The course material is deeply intertwined with the exercises, as it is intended that the student

actively learn the material (and practice thinking and writing rigorously) by proving several of the key results in the theory. Multiplicative Number Theory Springer Education is an admirable thing, but it is well to remember from time to time that nothing worth knowing can be taught. Oscar Wilde, " The Critic as Artist, " 1890. Analysis is a profound subject; it is neither easy to understand nor summarize. However, Real Analysis can be discovered by solving problems. This book aims to give independent students the opportunity to discover Real Analysis by themselves through problem solving. Thedept handcomplexityo fthetheoryofAnal ysiscanbeapprec iatedbytakingagli mpseatits developmental history. Although Analysis was conceived in the 17th century during the Scienti?c Revolution, it has taken nearly two hundred years to establish its theoretical basis. Kepler, Galileo, Descartes, Fermat, Newton and Leibniz were among those who contributed to its genesis. Deep conceptual changes in Analysis were brought about in the 19th century by Cauchy and Weierstrass. Furthermore, modern concepts such as open and closed sets were introduced in the 1900s. Today nearly every undergraduate mathematics program requires at least one semester of Real Analysis. Often, students

consider this course to be the most challenging or even intimidating of all their mathematics major requirements. The primary goal of this book is to alleviate those concerns by systematically solving the problems related to the core concepts of most analysis courses. In doing so, we hope that learning analysis becomes less taxing and thereby more satisfying.

Rational Points on Elliptic Curves Springer Nature This valuable book focuses on a collection of powerful methods of analysis that yield deep numb er-theoretical estimates. Particular attention is given to counting functions of prime numbers and multiplicative arithmetic functions. Both real variable (?elementary?) and complex variable (?analytic?) methods are employed. The reader is assumed to have knowledge of elementary number theory (abstract algebra will also do) and real and complex analysis. Specialized analytic techniques, including transform and Tauberian methods, are developed as ne eded.Comments and corrigenda for the book are found at http: // www.math.uiuc.e du/ diamond/

A Primer of Analytic Number Theory Springer Science & Business Media The implicit function theorem is one of the most important

theorems in analysis and its many variants are basic tools in partial differential equations and numerical analysis. This second edition of Implicit Functions and Solution Mappings presents an updated and more complete picture of the field by including solutions of problems that have been solved since the first edition was published, and places old and new results in a broader perspective. The purpose of this self-contained work is to provide a reference on the topic and to provide a unified collection of a number of results which are currently scattered throughout the literature. Updates to this edition include new sections in almost all chapters, new exercises and examples, updated commentaries to chapters and an enlarged index and references section.

Problems in Algebraic Number Theory World Scientific

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.

Implicit Functions and Solution Mappings Springer Science & Business Media

These notes

serve as course notes for an undergraduate course in number theory. Most if not all universities worldwide offer introductory courses in number theory for math majors and in many cases as an elective course. The notes contain a useful introduction to important topics that need to be addressed in a course in number theory. Proofs of basic theorems are presented in an interesting and comprehensive way that can be read and understood even by non-majors with the exception in the last three chapters where a background in analysis, measure theory and abstract algebra is required. The exercises are carefully chosen to broaden the understanding of the concepts. Moreover, these notes shed light on analytic number theory, a subject that is rarely seen or approached by undergraduate students. One of the unique characteristics of these notes is the careful choice of topics and its importance in the theory of numbers. The freedom is given in the last two chapters because of the advanced nature of the topics that are presented.

Calculus, Volume 2 Springer Science & Business Media [Hilbert's] style has not the

terseness of many of our modem authors in mathematics, which is based on the assumption that printer's labor and paper are costly but the reader's effort and time are not. H. Weyl [143] The purpose of this book is to describe the classical problems in additive number theory and to introduce the circle method and the sieve method, which are the basic analytical and combinatorial tools used to attack these problems. This book is intended for students who want to lel?Ill additive number theory, not for experts who already know it. For this reason, proofs include many "unnecessary" and "obvious" steps; this is by design. The archetypical theorem in additive number theory is due to Lagrange: Every nonnegative integer is the sum of four squares. In general, the set A of nonnegative integers is called an additive basis of order h if every nonnegative integer can be written as the sum of h not necessarily distinct elements of A. Lagrange 's theorem is the statement that the squares are a basis of order four. The set A is called a basis offinite order if A is a basis of order h for some positive integer h. Additive number theory is in large part the study of bases of finite order. The classical bases are the squares, cubes, and higher powers; the polygonal numbers; and the prime numbers. The classical questions associated with these bases are Waring's problem and the Goldbach conjecture.

Additive Number Theory The Classical Bases

Springer Science & Business Media

Number theory is one of the few areas of mathematics where problems of substantial interest can be fully described to someone with minimal mathematical background. Solving such problems sometimes requires difficult and deep methods. But this is not a universal phenomenon; many engaging problems can be successfully attacked with little more than one's mathematical bare hands. In this case one says that the problem can be solved in an elementary way. Such elementary methods and the problems to which they apply are the subject of this book. Not Always Buried Deep is designed to be read and enjoyed by those who wish to explore elementary methods in modern number theory. The heart of the book is a thorough introduction to elementary prime number theory, including Dirichlet's theorem on primes in arithmetic progressions, the Brun sieve, and the Erdos-Selberg proof of the prime number theorem. Rather than trying to present a comprehensive treatise, Pollack focuses on topics that are particularly attractive and accessible. Other topics

covered include Gauss's theory of cyclotomy and its applications to rational reciprocity laws, Hilbert's solution to Waring's problem, and modern work on perfect numbers. The nature of the material means that little is required in terms of prerequisites: The reader is expected to have prior familiarity with number theory at the level of an undergraduate course and a first course in modern algebra (covering groups, rings, and fields). The exposition is complemented by over 200 exercises and 400 references.