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Clear, detailed exposition that can be understood by readers with no background in advanced mathematics. More than 200 problems and full solutions, plus 100 numerical exercises. 1949 edition. The title of this book may be read in two ways. One is 'algebraic number-theory', that is, the theory of numbers viewed algebraically; the other, 'algebraic-number theory', the study of algebraic numbers. Both readings are compatible with our aims, and both are perhaps misleading. Misleading, because a proper coverage of either topic would require more space than is available, and demand more of the reader than we wish to; compatible, because our aim is to illustrate how some of the basic notions of the theory of algebraic numbers may be applied to problems in number theory. Algebra is an easy subject to compartmentalize, with topics such as 'groups', 'rings' or 'modules' being taught in comparative isolation. Many students view it this way. While it would be easy to exaggerate this tendency, it is not an especially desirable one. The leading mathematicians of the nineteenth and early twentieth centuries developed and used most of the basic results and techniques of linear algebra for perhaps a hundred years, without ever defining an abstract vector space: nor is there anything to suggest that they suf fered thereby. This historical fact may indicate that abstrac tion is not always as necessary as one commonly imagines; on the other hand the axiomatization of mathematics has led to enormous organizational and conceptual gains. Provides a grounding in random matrix techniques applied to analytic number theory. 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. A translation of Hilberts "Theorie der algebraischen Zahlkörper" best known as the "Zahlbericht", first published in 1897, in which he provides an elegantly integrated overview of the development of algebraic number theory up to the end of the nineteenth century. The Zahlbericht also provided a firm foundation for further research in the theory, and can be seen as the starting point for all twentieth century investigations into the subject, as well as reciprocity laws and class field theory. This English edition further contains an introduction by F. Lemmermeyer and N. Schappacher. This book is intended to serve as a one-semester introductory course in number theory. Throughout the book a historical perspective has been adopted and emphasis is given to some of the subject's applied aspects; in particular the field of cryptography is highlighted. At the heart of the book are the major number theoretic accomplishments of Euclid, Fermat, Gauss, Legendre, and Euler, and to fully illustrate the properties of numbers and concepts developed in the text, a wealth of exercises have been included. It is assumed that the reader will have 'pencil in hand' and ready access to a calculator or computer. For students new to number theory, whatever their background, this is a stimulating and entertaining introduction to the subject. The Classic Texts Series is the only of its kind selection of classic pieces of work that started off as bestseller and continues to be the bestseller even today. These classic texts have been designed so as to work as elementary textbooks which play a crucial role in building the concepts from scratch as in-depth knowledge of concepts is necessary for students preparing for various entrance exams.The present book on Higher Algebrapresents all the elements of Higher Algebra in a single book meant to work as textbook for the students beginning their preparation of the varied aspects covered under Higher Algebra. The present book has been divided into 35 chapters namely Ratio, Proportion, Variation, Arithmetical Progression, Geometrical Progression, Harmonical Progression Theorems Connected with The Progression, Scales of Notation, Surds & Imaginary Quantities, The

Theory of Quadratic Equations, Miscellaneous Equations, Permutations & Combinations, Mathematical Induction, Binomial Theorem Positive Integral Index, Binomial Theorem, Any Index, Multinational Theorem, Logarithms, Exponential & Logarithmic Series, Interest & Annuities, Inequalities, Limiting Values & Vanishing Fractions, Convergency&Divergency of Series, Undetermined Coefficients, Partial Fractions, Recurring Series, Continued Fractions, Recurring Series, Continued Fractions, Indeterminate Equations of the First Degree, Recurring Continued Fractions, Indeterminate Equations of the Second Degree, Summation of Series, Theory of Numbers, The General Theory of Continued Fractions, Probability, Determinants, Miscellaneous Theorems & Examples and Theory of Equations, each subdivided into number of topics. The first few chapters in the book have been devoted to a fuller discussion of Ratio, Proportions, Variation and the Progressions. Both the theoretical text as well as examples have been treated minutely which will help in better understanding of the concepts covered in the book. Theoretical explanation of the concepts in points has been provided at the beginning of each chapter. At the end of each chapter, unsolved practice exercises have been provided to help aspirants revise the concepts discussed in the chapter. At the end of chapterwise study, miscellaneous examples have also been given along with answers and solutions to the unsolved examples covered in each chapter. All the relevant theorems covered under the syllabi of Higher Algebra have also been covered in the detail in this book.As the book covers the whole syllabi of Higher Algebra in detail along with ample number of solved examples, it for sure will help the students perfect the varied concepts covered under the Higher Algebra section. Itpzf}JlOV, li~oxov uoq>ZUJlCJ. 7:WV Al(JX., llpoj1. AE(Jj1. The first part of this volume is based on a course taught at Princeton University in 1961-62; at that time, an excellent set ofnotes was prepared by David Cantor, and it was originally my intention to make these notes available to the mathematical public with only quite minor changes. Then, among some old papers of mine, I accidentally came across a long-forgotten manuscript by ChevaIley, of pre-war vintage (forgotten, that is to say, both by me and by its author) which, to my taste at least, seemed to have aged very welt It contained abrief but essentially com plete account of the main features of c1assfield theory, both local and global; and it soon became obvious that the usefulness of the intended volume would be greatly enhanced if I inc1uded such a treatment of this topic. It had to be expanded, in accordance with my own plans, but its outline could be preserved without much change. In fact, I have adhered to it rather c10sely at some critical points. The companion Web site -- To the student -- The foundations : logic, sets, and functions -- The fundamentals : algorithms, the integers, and matrices -- Mathematical reasoning -- Counting -- Advanced counting techniques -- Relations -- Graphs -- Trees -- Boolean algebra -- Modeling computation Number Theory Through Inquiry is an innovative textbook that leads students on a carefully guided discovery of introductory number theory. The book has two equally significant goals. One goal is to help students develop mathematical thinking skills, particularly, theorem-proving skills. The other goal is to help students understand some of the wonderfully rich ideas in the mathematical study of numbers. This book is appropriate for a proof transitions course, for an independent study experience, or for a course designed as an introduction to abstract mathematics. Math or related majors, future teachers, and students or adults interested in exploring mathematical ideas on their own will enjoy Number Theory Through Inquiry. Number theory is the perfect topic for an introduction-to-proofs course. Every college student is familiar with basic properties of numbers, and yet the exploration of those familiar numbers leads us to a rich landscape of ideas. Number Theory Through Inquiry contains a carefully arranged sequence of challenges that lead students to discover ideas about numbers and to discover methods of proof on their own. It is designed to be used with an instructional technique variously called guided discovery or Modified Moore Method or Inquiry Based Learning (IBL). Instructors' materials explain the instructional method. This style of instruction gives students a totally different experience compared to a standard lecture course. Here is the effect of this experience: Students learn to think independently: they learn to depend on their own reasoning to determine right from wrong; and they develop the central, important ideas of introductory number theory on their own. From that experience, they learn that they can personally create important ideas, and they develop an attitude of personal reliance and a sense that they can think effectively about difficult problems. These goals are fundamental to the educational enterprise within and beyond mathematics. Undergraduate text uses combinatorial approach to accommodate both math majors and liberal arts students. Covers the basics of number theory, offers an outstanding introduction to partitions, plus chapters on multiplicativity-divisibility, quadratic congruences, additivity, and more 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. 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. Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanys: 9780073383149 . This second edition updates the well-regarded 2001 publication with new short sections on topics like Catalan numbers and their relationship to Pascal's triangle and Mersenne numbers, Pollard rho factorization method, Hoggatt-Hensell identity. Koshy has added a new chapter on continued fractions. The unique features of the first edition like news of recent discoveries, biographical sketches of mathematicians, and applications--like the use of congruence in scheduling of a round-robin tournament--are being refreshed with current information. More challenging exercises are included both in the textbook and in the instructor's manual. Elementary Number Theory with Applications 2e is ideally suited for undergraduate students and is especially appropriate for prospective and in-service math teachers at the high school and middle school levels. * Loaded with pedagogical features including fully worked examples, graded exercises, chapter summaries, and computer exercises * Covers crucial applications of theory like computer security, ISBNs, ZIP codes, and UPC bar codes * Biographical sketches lay out the history of mathematics, emphasizing its roots in India and the Middle East This text provides a simple account of classical number theory, as well as some of the historical background in which the subject evolved. It is intended for use in a one-semester, undergraduate number theory course. From the acclaimed author of A Tour of the Calculus and The Advent of the Algorithm, here is a riveting look at mathematics that reveals a hidden world in some of its most fundamental concepts. In his latest foray into mathematics, David Berlinski takes on the simplest questions that can be asked: What is a number? How do addition, subtraction, multiplication, and division actually work? What are geometry and logic? As he delves into these subjects, he discovers and lucidly describes the beauty and complexity behind their seemingly simple exteriors, making clear how and why these mercurial, often slippery concepts are essential to who we are. Filled with illuminating historical anecdotes and asides on some of the most fascinating mathematicians through the ages, One, Two, Three is a captivating exploration of the foundation of mathematics: how it originated, who thought of it, and why it matters. Updated to reflect current research, Algebraic Number Theory and Fermat's Last Theorem, Fourth Edition introduces fundamental ideas of algebraic numbers and explores one of the most intriguing stories in the history of mathematics—the quest for a proof of Fermat's Last Theorem. The authors use this celebrated theorem to motivate a general study of the theory of algebraic numbers from a relatively concrete point of view. Students will see how Wiles's proof of Fermat's Last Theorem opened many new areas for future work. New to the Fourth Edition Provides up-to-date information on unique prime factorization for real quadratic number fields, especially Harper's proof that Z(?14) is Euclidean Presents an important new result: Mih?ilescu's proof of the Catalan conjecture of 1844 Revises and expands one chapter into two, covering classical ideas about modular functions and highlighting the new ideas of Frey, Wiles, and others that led to the long-sought proof of Fermat's Last Theorem Improves and updates the index, figures, bibliography, further reading list, and historical remarks Written by preeminent mathematicians Ian Stewart and David Tall, this text continues to teach students how to extend properties of natural numbers to more general number structures, including algebraic number fields and their rings of algebraic integers. It also explains how basic notions from the theory of algebraic numbers can be used to solve problems in number theory. This text provides a simple account of classical number theory, as well as some of the historical background in which the subject evolved. It is intended for use in a one-semester, undergraduate number theory course taken primarily by mathematics majors and students preparing to be secondary school teachers. Although the text was written with this readership in mind, very few formal prerequisites are required. Much of the text can be read by students with a sound background in high school mathematics. "With almost a thousand imaginative exercises and problems, this book stimulates curiosity about numbers and their properties." Elementary Number Theory, Seventh Edition, is written for the one-semester undergraduate number theory course taken by math majors, secondary education majors, and computer science students. This contemporary text provides a simple account of classical number theory, set against a historical background that shows the subject's evolution from antiquity to recent research. Written in David Burton's engaging style, Elementary Number Theory reveals the attraction that has drawn leading mathematicians and amateurs alike to number theory over the course of history. Elementary Number Theory, Seventh Edition, is written for the one-semester undergraduate number theory course taken by math majors, secondary education majors, and computer science students. This contemporary text provides a simple account of classical number theory, set against a historical background that shows the subject's evolution from antiquity to recent research. Written in David Burton's engaging style, Elementary Number Theory reveals the attraction that has drawn leading mathematicians and amateurs alike to number theory over the course of history. 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 is one of the oldest branches of mathematics that is primarily concerned with positive integers. While it has long been studied for its beauty and elegance as a branch of pure mathematics, it has seen a resurgence in recent years with the advent of the digital world for its modern applications in both computer science and cryptography. Number Theory: Step by Step is an undergraduate-level introduction to number theory that assumes no prior knowledge, but works to gradually increase the reader's confidence and ability to tackle more difficult material. The strength of the text is in its large number of examples and the step-by-step explanation of each topic as it is introduced to help aid understanding the abstract mathematics of number theory. It is compiled in such a way that allows self-study, with explicit solutions to all the set of problems freely available online via the companion website. Punctuating the text are short and engaging historical profiles that add context for the topics covered and provide a dynamic background for the subject matter. Modern number theory began with the work of Euler and Gauss to understand and extend the many unsolved questions left behind by Fermat. In the course of their investigations, they uncovered new phenomena in need of explanation, which over time led to the discovery of field theory and its intimate connection with complex multiplication. While most texts concentrate on only the elementary or advanced aspects of this story, Primes of the Form x2 + ny2 begins with Fermat and explains how his work ultimately gave birth to quadratic reciprocity and the genus theory of quadratic forms. Further, the book shows how the results of Euler and Gauss can be fully understood only in the context of class field theory. Finally, in order to bring class field theory down to earth, the book explores some of the magnificent formulas of complex multiplication. The central theme of the book is the story of which primes p can be expressed in the form x2 + ny2. An incomplete answer is given using quadratic forms. A better though abstract answer comes from class field theory, and finally, a concrete answer is provided by complex multiplication. Along the way, the reader is introduced to some wonderful number theory. Numerous exercises and examples are included. The book is written to be enjoyed by readers with modest mathematical backgrounds. Chapter 1 uses basic number theory and abstract algebra, while chapters 2 and 3 require Galois theory and complex analysis, respectively. Challenge And Thrill Of Pre-College Mathematics Is An Unusual Enrichment Text For Mathematics Of Classes 9, 10, 11 And 12 For Use By Students And Teachers Who Are Not Content With The Average Level That Routine Text Dare Not Transcend In View Of Their Mass Clientele. It Covers Geometry, Algebra And Trigonometry Plus A Little Of Combinatorics. Number Theory And Probability. It Is Written Specifically For The Top Half Whose Ambition Is To Excel And Rise To The Peak Without Finding The Journey A Forced Uphill Task.The Undercurrent Of The Book Is To Motivate The Student To Enjoy The Pleasures Of A Mathematical Pursuit And Of Problem Solving. More Than 300 Worked Out Problems (Several Of Them From National And International Olympiads) Share With The Student The Strategy, The Excitement, Motivation, Modeling, Manipulation, Abstraction, Notation And Ingenuity That Together Make Mathematics. This Would Be The Starting Point For The Student, Of A Life-Long Friendship With A Sound Mathematical Way Of Thinking.There Are Two Reasons Why The Book Should Be In The Hands Of Every School Or College Student, (Whether He Belongs To A Mathematics Stream Or Not) One, If He Likes Mathematics And, Two, If He Does Not Like Mathematics- The Former, So That The Cramped Robot-Type Treatment In The Classroom Does Not Make Him Into The Latter; And The Latter So That By The Time He Is Halfway Through The Book, He Will Invite Himself Into The Former. “Number Theory and Related Fields” collects contributions based on the proceedings of the "International Number Theory Conference in Memory of Alf van der Poorten," hosted by CARMA and held March 12-16th 2012 at the University of Newcastle, Australia. The purpose of the conference was to promote number theory research in Australia while commemorating the legacy of Alf van der Poorten, who had written over 170 papers on the topic of number theory and collaborated with dozens of researchers. The research articles and surveys presented in this book were written by some of the most distinguished mathematicians in the field of number theory, and articles will include related topics that focus on the various research interests of Dr. van der Poorten.? One of the oldest branches of mathematics, number theory is a vast field devoted to studying the properties of whole numbers. Offering a flexible format for a one- or two-semester course, Introduction to Number Theory uses worked examples, numerous exercises, and two popular software packages to describe a diverse array of number theory topi 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. A Course in Computational Number Theory uses the computer as a tool for motivation and explanation. The book is designed for the reader to quickly access a computer and begin doing personal experiments with the patterns of the integers. It presents and explains many of the fastest algorithms for working with integers. Traditional topics are covered, but the text also explores factoring algorithms, primality testing, the RSA public-key cryptosystem, and unusual applications such as check digit schemes and a computation of the energy that holds a salt crystal together. Advanced topics include continued fractions, Pell’s equation, and the Gaussian primes. Since the publication of the first edition of this work, considerable progress has been made in many of the questions examined. This edition has been updated and enlarged, and the bibliography has been revised. The variety of topics covered here includes divisibility, diophantine equations, prime numbers (especially Mersenne and Fermat primes), the basic arithmetic functions, congruences, the quadratic reciprocity law, expansion of real numbers into decimal fractions, decomposition of integers into sums of powers, some other problems of the additive theory of numbers and the theory of Gaussian integers. Number theory is the branch of mathematics primarily concerned with the counting numbers, especially primes. It dates back to the ancient Greeks, but today it has great practical importance in cryptography, from credit card security to national defence. This book introduces the main areas of number theory, and some of its most interesting problems. Why was the number of Hardy's taxi significant? Why does Graham's number need its own notation? How many grains of sand would fill the universe? What is the connection between the Golden Ratio and sunflowers? Why is 999 more than a distress call? All these questions and a host more are answered in this fascinating book, which has now been newly revised, with nearly 200 extra entries and some 250 additions to the original entries. From minus one and its square root, via cyclic, weird, amicable, perfect, untouchable and lucky numbers, aliquot sequences, the Cattle problem, Pascal's triangle and the Syracuse algorithm, music, magic and maps, pancakes, polyhedra and palindromes, to numbers so large that they boggle the imagination, all you ever wanted to know about numbers is here. There is even a comprehensive index for those annoying occasions when you remember the name but can't recall the number. Self-organized criticality (SOC) has become a magic word in various scientific disciplines; it provides a framework for understanding complexity and scale invariance in systems showing irregular fluctuations. In the first 10 years after Per Bak and his co-workers presented their seminal idea, more than 2000 papers on this topic appeared. Seismology has been a field in earth sciences where the SOC concept has already deepened the understanding, but there seem to be much more examples in earth sciences where applying the SOC concept may be fruitful. After introducing the reader into the basics of fractals, chaos and SOC, the book presents established and new applications of SOC in earth sciences, namely earthquakes, forest fires, landslides and drainage networks. "The topics are quite standard: convergence of sequences, limits of functions, continuity, differentiation, the Riemann integral, infinite series, power series, and convergence of sequences of functions. Many examples are given to illustrate the theory, and exercises at the end of each chapter are keyed to each section."--pub. desc. This graduate textbook offers an introduction to modern methods in number theory. It gives a complete account of the main results of class field theory as well as the Poitou-Tate duality theorems, considered crowning achievements of modern number theory. Assuming a first graduate course in algebra and number theory, the book begins with an introduction to group and Galois cohomology. Local fields and local class field theory, including Lubin-Tate formal group laws, are covered next, followed by global class field theory and the description of abelian extensions of global fields. The final part of the book gives an accessible yet complete exposition of the Poitou-Tate duality theorems. Two appendices cover the necessary background in homological algebra and the analytic theory of Dirichlet L-series, including the ?ebotarev density theorem. Based on several advanced courses given by the author, this textbook has been written for graduate students. Including complete proofs and numerous exercises, the book will also appeal to more experienced mathematicians, either as a text to learn the subject or as a reference. Number theory has a wealth of long-standing problems, the study of which over the years has led to major developments in many areas of mathematics. This volume consists of seven significant chapters on number theory and related topics. Written by distinguished mathematicians, key topics focus on multipartitions, congruences and identities (G. Andrews), the formulas of Koshliakov and Guinand in Ramanujan's Lost Notebook (B. C. Berndt, Y. Lee, and J. Sohn), alternating sign matrices and the Weyl character formulas (D. M. Bressoud), theta functions in complex analysis (H. M. Farkas), representation functions in additive number theory (M. B. Nathanson), and mock theta functions, ranks, and Maass forms (K. Ono), and elliptic functions (M. Waldschmidt). Irrationality and Transcendence in Number Theory tells the story of irrational numbers from their discovery in the days of Pythagoras to the ideas behind the work of Baker and Mahler on transcendence in the 20th century. It focuses on themes of irrationality, algebraic and transcendental numbers, continued fractions, approximation of real numbers by rationals, and relations between automata and transcendence. This book serves as a guide and introduction to number theory for advanced undergraduates and early postgraduates. Readers are led through the developments in number theory from ancient to modern times. The book includes a wide range of exercises, from routine problems to surprising and thought-provoking extension material. Features Uses techniques from widely diverse areas of mathematics, including number theory, calculus, set theory, complex analysis, linear algebra, and the theory of computation. Suitable as a primary textbook for advanced undergraduate courses in number theory, or as supplementary reading for interested postgraduates. Each chapter concludes with an appendix setting out the basic facts needed from each topic, so that the book is accessible to readers without any specific specialist background.