Introductory Algebraic Number Theory Alaca

The objective of this book is to provide tools for solving problems which involve cubic number fields. Many such problems can be considered geometrically; both in terms of the geometry of numbers and geometry of the associated cubic Diophantine equations that are similar in many ways to the Pell equation. With over 50 geometric diagrams, this book includes illustrations of many of these topics. The book may be thought of as a companion reference for those students of algebraic number theory who wish to find more examples, a collection of recent research results on cubic fields, an easy-to-understand source for learning about Voronoi’s unit algorithm and several classical results which are still relevant to the field, and a book which helps bridge a gap in understanding connections between algebraic geometry and number theory. The exposition includes numerous discussions on calculating with cubic fields including simple continued fractions of cubic irrational numbers, arithmetic using integer matrices, ideal class group computations, lattices over cubic fields, construction of cubic fields with a given discriminant, the search for elements of norm 1 of a cubic field with rational parametrization, and Voronoi's algorithm for finding a system of fundamental units. Throughout, the discussions are framed in terms of a binary cubic form that may be used to describe a given cubic field. This unifies the chapters of this book despite the diversity of their number theoretic topics.

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.

Requiring no more than a basic knowledge of abstract algebra, this text presents the mathematics of number fields in a straightforward, pedestrian manner. It therefore avoids local methods and presents proofs in a way that highlights the important parts of the arguments. Readers are assumed to be able to fill in the details, which in many places are left as exercises.

An introduction to algebraic number theory for senior undergraduates and beginning graduate students in mathematics. It includes numerous examples, and references to further reading and to biographies of mathematicians who have contributed to the development of the subject. Includes over 320 exercises, and an extensive index.

Introductory Algebraic Number Theory

The problems are systematically arranged to reveal the evolution of concepts and ideas of the subject Includes various levels of problems - some are easy and straightforward, while others are more challenging All problems are elegantly solved

In this set of lecture notes, the author includes some of the latest research on the theory of Morrey Spaces associated with Harmonic Analysis. There are three main claims concerning these spaces that are covered: determining the integrability classes of the trace of Riesz potentials of an arbitrary Morrey function; determining the dimensions of singular sets of weak solutions of PDE (e.g. The Meyers-Elcart System); and determining whether there are any “full” interpolation results for linear operators between Morrey spaces. This book will serve as a useful reference to graduate students and researchers interested in Potential Theory, Harmonic Analysis, PDE, and/or Morrey Space Theory.

This book collects the papers presented at the Conference on Number Theory, held at the Kerala School of Mathematics, Kozhikode, Kerala, India, from December 10–14, 2018. The conference aimed at bringing the active number theorists and researchers in automorphic forms and allied areas to demonstrate their current research works. This book benefits young research scholars, postdoctoral fellows, and young faculty members working in these areas of research.

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. Elementary Number Theory, Sixth Edition, blends classical theory with modern applications and is notable for its outstanding exercise sets. A full range of exercises, from basic to challenging, helps readers explore key concepts and push their understanding to new heights. Computational exercises and computer projects are also available. Reflecting many years of professors' feedback, this edition offers new examples, exercises, and applications, while incorporating advancements and discoveries in number theory made in the past few years.

Gauss famously referred to mathematics as the “queen of the sciences” and to number theory as the “queen of mathematics”. This book is an introduction to algebraic number theory, meaning the study of arithmetic in finite extensions of the rational number field Q . Originating in the work of Gauss, the foundations of modern algebraic number theory are due to Dirichlet, Dedekind, Kronecker, Kummer, and others. This book lays out basic results, including the three “fundamental theorems”: unique factorization of ideals, finiteness of the class number, and Dirichlet's unit theorem. While these theorems are by now quite classical, both the text and the exercises allude frequently to more recent developments. In addition to traversing the main highways, the book reveals some remarkable vistas by exploring scenic side roads. Several topics appear that are not present in the usual introductory texts. One example is the inclusion of an extensive discussion of the theory of elasticity, which provides a precise way of measuring the failure of unique factorization. The book is based on the author's notes from a course delivered at the University of Georgia; pains have been taken to preserve the conversational style of the original lectures.

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.

A gentle introduction to Liouville's powerful method in elementary number theory. Suitable for advanced undergraduate and beginning graduate students.

Bringing the material up to date to reflect modern applications, Algebraic Number Theory, Second Edition has been completely rewritten and reorganized to incorporate a new style, methodology, and presentation. This edition focuses on integral domains, ideals, and unique factorization in the first chapter; field extensions in the second chapter; and

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 largest and most popular subject areas in mathematics, and this book is a superb entry to the subject. It features a well-known international author and covers enough material to satisfy both students and the serious researcher. A splendid addition to the marque series of the AMS publishing program.

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.

Great first book on algebraic topology. Introduces (co)homology through singular theory.

Fuzzy set theory provides us with a framework which is wider than that of classical set theory. Various mathematical structures, whose features emphasize the effects of ordered structure, can be developed on the theory. Fuzzy topology is one such branch, combining ordered structure with topological structure. This branch of mathematics, emerged from the background — processing fuzziness, and locale theory, proposed from the angle of pure mathematics by the great French mathematician Ehresmann, comprise the two most active aspects of topology on lattice, which affect each other. This book is the first monograph to systematically reflect the up-to-date state of fuzzy topology. It emphasizes the so-called “pointed approach” and the effects of stratification structure appearing in fuzzy sets. The monograph can serve as a reference book for mathematicians, researchers, and graduate students working in this branch of mathematics. After an appropriate rearrangements of the chapters and sections, it can also be used as a text for undergraduates. Contents:Fuzzy Topological SpacesOperations on Fuzzy Topological SpacesL-Valued Stratification SpacesConvergence TheoryConnectednessSome Properties Related to CardinalsSeparation (I)Separation (II)CompactnessCompactificationParacompactnessUniformity and ProximityMetric SpacesRelations Between Fuzzy Topological Spaces and Locales Readership: Senior undergraduates, graduate students, and researchers in mathematics and computer science. keywords:Fuzzy;Topology;Fuzzy Lattice;Lattice-valued Topology;Multiple Choice Principle;Coincident Neighborhood Structure;Level Structure;Pointlike Structure;Ordered Structure;Locale “This will be a very useful reference book for everyone working in this field.” Mathematical Reviews

From its history as an elegant but abstract area of mathematics, algebraic number theory now takes its place as a useful and accessible study with important real-world practicality. Unique among algebraic number theory texts, this important work offers a wealth of applications to cryptography, including factoring, primality-testing, and public-key cryptosystems. A follow-up to Dr. Mollin's popular Fundamental Number Theory with Applications, Algebraic Number Theory provides a global approach to the subject that selectively avoids local theory. Instead, it carefully leads the student through each topic from the level of the algebraic integer, to the arithmetic of number fields, to ideal theory, and closes with reciprocity laws. In each chapter the author includes a section on a cryptographic application of the ideas presented, effectively demonstrating the pragmatic side of theory. In this way Algebraic Number Theory provides a comprehensible yet thorough treatment of the material. Written for upper-level undergraduate and graduate courses in algebraic number theory, this one-of-a-kind text brings the subject matter to life with historical background and real-world practicality. It easily serves as the basis for a range of courses, from bare-bones algebraic number theory, to a course rich with cryptography applications, to a course using the basic theory to prove Fermat's Last Theorem for regular primes. Its offering of over 430 exercises with odd-numbered solutions provided in the back of the book and, even-numbered solutions available a separate manual makes this the ideal text for both students and instructors.

In contrast to those who see the 1950s as essentially a conservative period, and who view the 1960s as a time of rapid moral change, The Permissive Society points to the emergence of a liberalizing impulse during the Truman and Eisenhower years. The book shows how, during the 1950s, a traditionalist moral framework was beginning to give way to a less authoritarian approach to moral issues as demonstrated by a more relaxed style of child-rearing, the rising status of women both inside and outside the home, the increasing reluctance of Americans to regard alcoholism as a sin, loosening sexual attitudes, the increasing influence of modern psychology, and, correspondingly, the declining influence of religion in the personal lives of most Americans.

. . . if one wants to make progress in mathematics one should study the masters not the pupils. N. H. Abel Heeke was certainly one of the masters, and in fact, the study of Heeke L series and Heeke operators has permanently embedded his name in the fabric of number theory. It is a rare occurrence when a master writes a basic book, and Heeke's Lectures on the Theory of Algebraic Numbers has become a classic. To quote another master, Andre Weil: "To improve upon Heeke, in a treatment along classical lines of the theory of algebraic numbers, would be a futile and impossible task. " We have tried to remain as close as possible to the original text in pre serving Heeke's rich, informal style of exposition. In a very few instances we have substituted modern terminology for Heeke's, e. g. , "torsion free group" for "pure group. " One problem for a student is the lack of exercises in the book. However, given the large number of texts available in algebraic number theory, this is not a serious drawback. In particular we recommend Number Fields by D. A. Marcus (Springer-Verlag) as a particularly rich source. We would like to thank James M. Vaughn Jr. and the Vaughn Foundation Fund for their encouragement and generous support of Jay R. Goldman without which this translation would never have appeared.

Minneapolis George U. Brauer July 1981 Jay R.

The first volume of The Handbook of Humidity Measurement focuses on the review of devices based on optical principles of measurement such as optical UV, fluorescence hygrometers, optical and fiber-optic sensors of various types. Numerous methods for monitoring the atmosphere have been developed in recent years, based on measuring the absorption of electromagnetic field in different spectral ranges. These methods, covering the optical (FTIR and Lidar techniques), as well as a microwave and THz ranges are discussed in detail in this volume. The role of humidity-sensitive materials in optical and fiber-optic sensors is also detailed. This volume describes the reasons for controlling the humidity, features of water and water vapors, and units used for humidity measurement.

The book is aimed at people working in number theory or at least interested in this part of mathematics. It presents the development of the theory of algebraic numbers up to the year 1950 and contains a rather complete bibliography of that period. The reader will get information about results obtained before 1950. It is hoped that this may be helpful in preventing rediscoveries of old results, and might also inspire the reader to look at the work done earlier, which may hide some ideas which could be applied in contemporary research.

This book is a translation of my book Suron Josetsu (An Introduction to Number Theory), Second Edition, published by Shokabo, Tokyo, in 1988. The translation is faithful to the original globally but, taking advantage of my being the translator of my own book, I felt completely free to reform or deform the original locally everywhere. When I sent T. Tamagawa a copy of the First Edition of the original work two years ago, he immediately pointed out that I had skipped the discussion of the class numbers of real quadratic fields in terms of continued fractions and (in a letter dated 2/15/87) sketched his idea of treating continued fractions without writing explicitly continued fractions, an approach he had first presented in his number theory lectures at Yale some years ago. Although I did not follow his approach exactly, I added to this translation a section (Section 4. 9), which nevertheless fills the gap pointed out by Tamagawa. With this addition, the present book covers at least T. Takagi's Shoto Seisuron Kogi (Lectures on Elementary Number Theory), First Edition (Kyoritsu, 1931), which, in turn, covered at least Dirichlet's Vorlesungen. It is customary to assume basic concepts of algebra (up to, say, Galois theory) in writing a textbook of algebraic number theory. But I feel a little strange if I assume Galois theory and prove Gauss quadratic reciprocity.

ANALYSIS AND ITS APPLICATIONS discusses Nonlinear Analysis; Operator Theory; Fixed Point Theory; Set-valued Analysis; Variational Analysis (including Variational Inequalities); Convex Analysis; Smooth and Nonsmooth Analysis; Vector Optimization; Wavelet Analysis; Sequence Spaces and Matrix Transformations. This volume will be of immense value to researchers and professionals working in the wide domain of analysis and its applications.

To be used for a reading course or as a supplemental text for a course in number theory.

This textbook, based on lectures given over a period of years at Cambridge, is a detailed and thorough introduction to Galois theory.

Developed from the author's popular text, A Concise Introduction to the Theory of Numbers, this book provides a comprehensive initiation to all the major branches of number theory. Beginning with the rudiments of the subject, the author proceeds to more advanced topics, including elements of cryptography and primality testing, an account of number fields in the classical vein including properties of their units, ideals and ideal classes, aspects of analytic number theory including studies of the Riemann zeta-function, the prime-number theorem and primes in arithmetical progressions, a description of the Hardy–Littlewood and sieve methods from respectively additive and multiplicative number theory and an exposition of the arithmetic of elliptic curves. The book includes many worked examples, exercises and further reading. Its wider coverage and versatility make this book suitable for courses extending from the elementary to beginning graduate studies.

This book gathers original research papers and survey articles presented at the "International Conference on Class Groups of Number Fields and Related Topics," held at Harish-Chandra Research Institute, Allahabad, India, on September 4–7, 2017. It discusses the fundamental research problems that arise in the study of class groups of number fields and introduces new techniques and tools to study these problems. Topics in this book include class groups and class numbers of number fields, units, the Kummer–Vandiver conjecture, class number one problem, Diophantine equations, Thue equations, continued fractions, Euclidean number fields, heights, rational torsion points on elliptic curves, cyclotomic numbers, Jacobi sums, and Dedekind zeta values. This book is a valuable resource for undergraduate and graduate students of mathematics as well as researchers interested in class groups of number fields and their connections to other branches of mathematics. New researchers to the field will also benefit immensely from the diverse problems discussed. All the contributing authors are leading academicians, scientists, researchers, and scholars.

The systematic development of techniques for the explicit calculation of the basic invariants such as rings of integers, class groups, and units, is emphasized throughout this introduction to the foundations of algebraic number theory.

Algebraic number theory introduces students not only to new algebraic notions but also to related concepts: groups, rings, fields, ideals, quotient rings and quotient fields, homomorphisms and isomorphisms, modules, and vector spaces. Author Pierre Samuel notes that students benefit from their studies of algebraic number theory by encountering many concepts fundamental to other branches of mathematics — algebraic geometry, in particular. This book assumes a knowledge of basic algebra but supplements its teachings with brief, clear explanations of integrality, algebraic extensions of fields, Galois theory, Noetherian rings and modules, and rings of fractions. It covers the basics, starting with the divisibility theory in principal ideal domains and ending with the unit theorem, finiteness of the class number, and the more elementary theorems of Hilbert ramification theory. Numerous examples, applications, and exercises appear throughout the text.

This is a second edition of Lang's well-known textbook. It covers all of the basic material of classical algebraic number theory, giving the student the background necessary for the study of further topics in algebraic number theory, such as cyclotomic fields, or modular forms. "Lang's books are always of great value for the graduate student and the research mathematician. This updated edition of Algebraic number theory is no exception."—-MATHEMATICAL REVIEWS

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.

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.

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.

Conference proceedings based on the 1996 LMS Durham Symposium 'Galois representations in arithmetic algebraic geometry'.

This textbook covers a wide array of topics in analytic and multiplicative number theory, suitable for graduate level courses. Extensively revised and extended, this Advanced Edition takes a deeper dive into the subject, with the elementary topics of the previous edition making way for a fuller treatment of more advanced topics. The core themes of the distribution of prime numbers, arithmetic functions, lattice points, exponential sums and number fields now contain many more details and additional topics. In addition to covering a range of classical and standard results, some recent work on a variety of topics is discussed in the book, including arithmetic functions of several variables, bounded gaps between prime numbers à la Yitang Zhang, Mordell's method for exponential sums over finite fields, the resonance method for the Riemann zeta function, the Hooley divisor function, and many others. Throughout the book, the emphasis is on explicit results. Assuming only familiarity with elementary number theory and analysis at an undergraduate level, this textbook provides an accessible gateway to a rich and active area of number theory. With an abundance of new topics and 50% more exercises, all with solutions, it is now an even better guide for independent study.