An Introduction To Diophantine Equations A Proble

Harold Davenport was one of the truly great mathematicians of the twentieth century. Based on lectures he gave at the University of Michigan in the early 1960s, this book is concerned with the use of analytic methods in the study of integer solutions to Diophantine equations and Diophantine inequalities. It provides an excellent introduction to a timeless area of number theory that is still as widely researched today as it was when the book originally appeared. The three main themes of the book are Waring's problem and the representation of integers by diagonal forms, the solubility in integers of systems of forms in many variables, and the solubility in integers of diagonal inequalities. For the second edition of the book a comprehensive foreword has been added in which three prominent authorities describe the modern context and recent developments. A thorough bibliography has also been added.

The first thing you will find out about this book is that it is fun to read. It is meant for the browser, as well as for the student and for the specialist wanting to know about the area. The footnotes give an historical background to the text, in addition to providing deeper applications of the concept that is being cited. This

allows the browser to look more deeply into the history or to pursue a given sideline. Those who are only marginally interested in the area will be able to read the text, pick up information easily, and be entertained at the same time by the historical and philosophical digressions. It is rich in structure and motivation in its concentration upon quadratic orders. This is not a book that is primarily about tables, although there are 80 pages of appendices that contain extensive tabular material (class numbers of real and complex quadratic fields up to 104; class group structures; fundamental units of real quadratic fields; and more!). This book is primarily a reference book and graduate student text with more than 200 exercises and a great deal of hints! The motivation for the text is best given by a quote from the Preface of Quadratics: "There can be no stronger motivation in mathematical inquiry than the search for truth and beauty. It is this author's long-standing conviction that number theory has the best of both of these worlds. In particular, algebraic and computational number theory have reached a stage where the current state of affairs richly deserves a proper elucidation. It is this author's goal to attempt to shine the best possible light on the subject."
This is a integrated presentation of the theory of exponential diophantine equations. The authors present, in a clear and unified fashion, applications to exponential diophantine equations and linear recurrence sequences of the Gelfond-Baker theory of linear forms in logarithms of algebraic numbers. Topics

covered include the Thue equations, the generalised hyperelliptic equation, and the Fermat and Catalan equations. The necessary preliminaries are given in the first three chapters. Each chapter ends with a section giving details of related results.

Geometry and the theory of numbers are as old as some of the oldest historical records of humanity. Ever since antiquity, mathematicians have discovered many beautiful interactions between the two subjects and recorded them in such classical texts as Euclid's Elements and Diophantus's Arithmetica. Nowadays, the field of mathematics that studies the interactions between number theory and algebraic geometry is known as arithmetic geometry. This book is an introduction to number theory and arithmetic geometry, and the goal of the text is to use geometry as the motivation to prove the main theorems in the book. For example, the fundamental theorem of arithmetic is a consequence of the tools we develop in order to find all the integral points on a line in the plane. Similarly, Gauss's law of quadratic reciprocity and the theory of continued fractions naturally arise when we attempt to determine the integral points on a curve in the plane given by a quadratic polynomial equation. After an introduction to the theory of diophantine equations, the rest of the book is structured in three acts that correspond to the study of the integral and rational solutions of linear, quadratic, and cubic curves, respectively. This book describes many applications including modern applications in cryptography; it also presents some recent results in arithmetic geometry. With many exercises, this book can be used as a text for a first course in number theory or for a subsequent course on arithmetic (or diophantine) geometry at the junior-senior level.

An Introduction

Second English Edition (edited by A. Schinzel)

Diophantine Equations and Power Integral Bases

An Invitation to Modern Number Theory

Number Theory and Geometry: An Introduction to Arithmetic Geometry

Diophantine Geometry

This book eases students into the rigors of university mathematics. The emphasis is on understanding and constructing proofs and writing clear mathematics. The author achieves this by exploring set theory, combinatorics, and number theory, topics that include many fundamental ideas and may not be a part of a young mathematician's toolkit. This material illustrates how familiar ideas can be formulated rigorously, provides examples demonstrating a wide range of basic methods of proof, and includes some of the all-time-great classic proofs. The book presents mathematics as a continually developing subject. Material meeting the needs of readers from a wide range of backgrounds is included. The over 250 problems include questions to interest and challenge the most able student but also plenty of routine exercises to help familiarize the reader with the basic ideas.

This self-contained treatment covers approximation of irrationals by rationals, product of linear forms, multiples of an irrational number, approximation of complex numbers, and product of complex linear forms. 1963 edition.

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.

Welcome to diophantine analysis--an area of number theory in which we attempt to discover hidden treasures and truths within the jungle of numbers by exploring rational numbers. Diophantine analysis comprises two different but interconnected domains--diophantine approximation and diophantine equations. This highly readable book brings to life the fundamental ideas and theorems from diophantine approximation, geometry of numbers, diophantine geometry and p-adic analysis. Through an engaging style, readers participate in a journey through these areas of number theory. Each mathematical theme is presented in a self-contained manner and is motivated by very basic notions. The reader becomes an active participant in the explorations, as each module includes a sequence of numbered questions to be answered and statements to be verified. Many hints and remarks are provided to be freely used and enjoyed. Each module then closes with a Big Picture Question that invites the reader to step back from all the technical details and take a panoramic view of how the ideas at hand fit into the larger mathematical landscape. This book enlists the reader to build intuition, develop ideas and prove results in a very user-friendly and enjoyable environment. Little background is required and a familiarity with number theory is not expected. All that is needed for most of the material is an understanding of calculus and basic linear algebra together with the desire and ability to prove theorems. The minimal background requirement combined with the author's fresh approach and engaging style make this book enjoyable and accessible to second-year undergraduates, and even advanced high school students. The author's refreshing new spin on more traditional discovery approaches makes this book appealing to any mathematician and/or fan of number theory.

Arithmetic of Quadratic Forms

Elementary Theory of Numbers

Curves, Counting, and Number Theory

Volume II: Analytic and Modern Tools

Analytic Methods for Diophantine Equations and Diophantine Inequalities

A Journey Into Diophantine Analysis

Work examines the latest algorithms and tools to solve classical types of diophantine equations.; Unique book---closest competitor, Smart, Cambridge, does not treat index form equations.; Author is a leading researcher in the field of computational algebraic number theory.; The text is illustrated with several tables of various number fields, including their data on power integral bases.; Several interesting properties of number

fields are examined.; Some infinite parametric families of fields are also considered as well as the resolution of the corresponding infinite parametric families of diophantine equations.

This text provides a detailed introduction to number theory, demonstrating how other areas of mathematics enter into the study of the properties of natural numbers. It contains problem sets within each section and at the end of each chapter to reinforce essential concepts, and includes up-to-date information on divisibility problems, polynomial congruence, the sums of squares and trigonometric sums.;Five or more copies may be ordered by college or university bookstores at a special price, available on application.

The theory of numbers is generally considered to be the 'purest' branch of pure mathematics and demands exactness of thought and exposition from its devotees. It is also one of the most highly active and engaging areas of mathematics. Now into its eighth edition The Higher Arithmetic introduces the concepts and theorems of number theory in a way that does not require the reader to have an in-depth knowledge of the theory of numbers but also touches upon matters of deep mathematical significance. Since earlier editions, additional material written by J. H. Davenport has been added, on topics such as Wiles' proof of Fermat's Last Theorem, computers and number theory, and primality testing. Written to be accessible to the general reader, with only high school mathematics as prerequisite, this classic book is also ideal for undergraduate courses on number theory, and covers all the necessary material clearly and succinctly.

This problem-solving book is an introduction to the study of Diophantine equations, a

class of equations in which only integer solutions are allowed. The presentation features some classical Diophantine equations, including linear, Pythagorean, and some higher degree equations, as well as exponential Diophantine equations. Many of the selected exercises and problems are original or are presented with original solutions. An Introduction to Diophantine Equations: A Problem-Based Approach is intended for undergraduates, advanced high school students and teachers, mathematical contest participants — including Olympiad and Putnam competitors — as well as readers interested in essential mathematics. The work uniquely presents unconventional and non-routine examples, ideas, and techniques.

An Introduction to Pure and Applied Mathematics

An Elementary Introduction Through Diophantine Problems

Recurrence Sequences

Number Theory Revealed: An Introduction

A Computational Cookbook

The Higher Arithmetic

A step-by-step guide to Langlands' early work leading up the Langlands Program for mathematicians and advanced students.

This book describes the theories and developments in Nevanlinna theory and Diophantine approximation. Although these two subjects belong to the different areas: one in complex analysis and one in number theory, it has been discovered that a number of striking similarities exist between these two subjects. A growing

understanding of these connections has led to significant advances in both fields. Outstanding conjectures from decades ago are being solved.Over the past 20 years since the first edition appeared, there have been many new and significant developments. The new edition greatly expands the materials. In addition, three new chapters were added. In particular, the theory of algebraic curves, as well as the algebraic hyperbolicity, which provided the motivation for the Nevanlinna theory.

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.

"A unique collection of topics centered on a unifying topic. Includes more than 350 exercises. Text is largely self-contained. The central theme of this graduate-level number theory textbook is the solution of Diophantine equations, i.e., equations or systems of polynomial equations which must be solved in integers, rational numbers or more generally in algebraic numbers. This theme, in particular, is the central motivation for the modern theory of arithmetic algebraic geometry. In this text, this is considered through three aspects. The first is the local aspect: one can do analysis in p-adic fields, and here the author starts by looking at solutions in finite fields, then proceeds to lift these solutions to local solutions using Hensel lifting. The second is the global aspect: the use of number fields, and in particular of class groups and unit groups. This classical subject is here illustrated through a wide range of examples. The third aspect deals with specific classes of equations, and in particular the general and

Diophantine study of elliptic curves, including 2 and 3-descent and the Heegner point method. These subjects form the first two parts, forming Volume I. The study of Bernoulli numbers, the gamma function, and zeta and L-functions, and of p-adic analogues is treated at length in the third part of the book, including many interesting and original applications. Much more sophisticated techniques have been brought to bear on the subject of Diophantine equations, and for this reason, the author has included five chapters on these techniques forming the fourth part, which together with the third part forms Volume II. These chapters were written by Yann Bugeaud, Guillaume Hanrot, Maurice Mignotte, Sylvain Duquesne, Samir Siksek, and the author, and contain material on the use of Galois representations, points on higher-genus curves, the superfermat equation, Mihailescu's proof of Catalan's Conjecture, and applications of linear forms in logarithms. The book contains 530 exercises of varying difficulty from immediate consequences of the main text to research problems, and contain many important additional results."--Publisher's website.

An Introduction to Diophantine Equations for Control Theory

An Introduction to the Theory of Numbers

Exploring the Number Jungle

Nevanlinna Theory And Its Relation To Diophantine Approximation (Second Edition)

Algorithms for Diophantine Equations
Number Theory

Number Theory Revealed: An Introduction acquaints undergraduates with the "Queen of Mathematics". The text offers a fresh take on congruences, power residues, quadratic residues, primes, and Diophantine equations and presents hot topics like cryptography, factoring, and primality testing. Students are also introduced to beautiful enlightening questions like the structure of Pascal's triangle mod p p and modern twists on traditional questions like the values represented by binary quadratic forms and large solutions of equations. Each chapter includes an "elective appendix" with additional reading, projects, and references. An expanded edition, Number Theory Revealed: A Masterclass, offers a more comprehensive approach to these core topics and adds additional material in further chapters and appendices, allowing instructors to create an individualized course tailored to their own (and their students') interests.

This text treats the classical theory of quadratic diophantine equations and guides the reader through the last two decades of computational techniques and progress in the area. The presentation features two basic methods to investigate and motivate the study of quadratic diophantine equations: the theories of continued fractions and quadratic fields. It also discusses Pell's equation and its generalizations, and presents some important quadratic diophantine equations and applications. The inclusion of examples makes this book useful for both research and classroom settings.

Number Theory in Science and Communication introductes non-mathematicians to the fascinating and diverse applications of number theory. This best-selling book stresses intuitive understanding rather than abstract theory. This revised fourth edition is augmented by recent advances in primes in progressions, twin primes, prime triplets, prime quadruplets and quintruplets, factoring with elliptic curves, quantum factoring, Golomb rulers and "baroque" integers.

A coherent account of the computational methods used to solve diophantine equations.

Quadratic Number Fields

Diophantine Classes and Extensions to Global Fields

Elliptic Tales

Course Notes from a Summer School

Solving the Pell Equation

With Applications in Cryptography, Physics, Digital Information, Computing, and Self-Similarity

Elliptic Tales describes the latest developments in number theory by looking at one of the most exciting unsolved problems in contemporary mathematics--the Birch and Swinnerton-Dyer Conjecture. The Clay Mathematics Institute is offering a prize of $1 million to anyone who can discover a general solution to the problem. The key to the conjecture lies in elliptic curves, which are cubic equations in two variables. These equations may appear simple, yet they arise from

some very deep--and often very mystifying--mathematical ideas. Using only basic algebra and calculus while presenting numerous eye-opening examples, Ash and Gross make these ideas accessible to general readers, and, in the process, venture to the very frontiers of modern mathematics. Along the way, they give an informative and entertaining introduction to some of the most profoundmay appear simple, yet they arise from some very deep--and often very mystifying--mathematical ideas. Using only basic algebra and calculus while presenting numerous eye-opening examples, Ash and Gross make these ideas accessible to general readers, and, in the process, venture to the very frontiers of modern mathematics. Along the way, they give an informative and entertaining introduction to some of the most profound discoveries of the last three centuries in algebraic geometry, abstract algebra, and number theory. They demonstrate how mathematics grows more abstract to tackle ever more challenging problems, and how each new generation of mathematicians builds on the accomplishments of those who preceded them. Ash and Gross fully explain how the Birch and Swinnerton-Dyer Conjecture sheds light on the number theory of elliptic curves, and how it provides a beautiful and startling connection between two very different objects arising from an elliptic curve, one based on calculus, the other on algebra. This book is divided into two parts. The first part is preliminary *and consists of algebraic number theory and the theory of semisimple algebras. There are two principal topics: classification of quadratic forms and quadratic Diophantine equations. The second topic is a new framework which contains the investigation of Gauss on the sums of three squares as a special case. To make the book concise, the author proves some basic theorems in number theory only in some special cases. However, the book is self-contained when the base field is the rational number field, and the main theorems are stated with an arbitrary number field as the base field. So the reader familiar with class field theory will be able to learn the arithmetic theory of quadratic forms with no further references.*

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.

This textbook presents an elementary introduction to number theory and its different aspects: approximation of real numbers,

irrationality and transcendence problems, continued fractions, diophantine equations, quadratic forms, arithmetical functions and algebraic number theory. Clear, concise, and self-contained, the topics are covered in 12 chapters with more than 200 solved exercises. The textbook may be used by undergraduates and graduate students, as well as high school mathematics teachers. More generally, it will be suitable for all those who are interested in number theory, the fascinating branch of mathematics.

Theory and Algorithms

Numbers, Sets and Functions

Diophantine Approximations

Diophantine Analysis

An Introduction to Mathematical Reasoning

Diophantus and Diophantine Equations

"This book by a leading researcher and masterly expositor of the subject studies diophantine approximations to algebraic numbers and their applications to diophantine equations. The methods are classical, and the results stressed can be obtained without much background in algebraic geometry. In particular, Thue equations, norm form equations and S-unit equations, with emphasis on recent explicit bounds on the number of solutions, are included. The book will be useful for graduate students and researchers." (L'Enseignement Mathematique) "The rich Bibliography includes more than hundred references. The book is easy to read, it may be a useful piece of reading not only for experts but for students as well." Acta Scientiarum Mathematicarum

This book tells the story of Diophantine analysis, a subject that, owing to its thematic proximity to algebraic geometry, became fashionable in the last half century and has remained so ever since. This new treatment of the methods of Diophantus--a person whose very existence has long been doubted by most historians of mathematics--will be accessible to readers who have taken some university mathematics. It includes the elementary facts of algebraic geometry indispensable for its understanding. The heart of the book is a fascinating account of the development of Diophantine methods during the. Recurrence sequences are of great intrinsic interest and have been a central part of number theory for many years. Moreover, these sequences appear almost everywhere in mathematics and computer science. This book surveys the modern theory of linear recurrence sequences and their generalizations. Particular emphasis is placed on the dramatic impact that sophisticated methods from Diophantine analysis and transcendence theory have had on the subject. Related work on bilinear recurrences and an emerging connection between recurrences and graph theory are covered. Applications and links to other areas of mathematics are described, including combinatorics, dynamical systems and cryptography, and computer science. The book is suitable for researchers interested in number theory, combinatorics, and graph theory.
Pell’s Equation is a very simple Diophantine equation that has been known to mathematicians for over 2000 years. Even today research involving this equation continues to be very active, as can be seen by the publication of at least 150 articles related to this equation over the past decade. However, very few modern books have been published on Pell’s Equation, and this will be the first to give a historical development of the equation, as well as to develop the necessary tools for solving the equation. The authors provide a friendly introduction for advanced undergraduates to the delights of algebraic number theory via Pell’s Equation. The only prerequisites are a basic knowledge of elementary number theory

and abstract algebra. There are also numerous references and notes for those who wish to follow up on various topics.

Diophantine Equations

Number Theory in Science and Communication

Diophantine Approximations and Diophantine Equations

New Computational Methods

Unit Equations in Diophantine Number Theory

Number Theory: Introduction to diophantine equations

Publisher description

This collection of course notes from a number theory summer school focus on aspects of Diophantine Analysis, addressed to Master and doctoral students as well as everyone who wants to learn the subject. The topics range from Baker's method of bounding linear forms in logarithms (authored by Sanda Bujačić and Alan Filipin), metric diophantine approximation discussing in particular the yet unsolved Littlewood conjecture (by Simon Kristensen), Minkowski's geometry of numbers and modern variations by Bombieri and Schmidt (Tapani Matala-aho), and a historical account of related number theory(ists) at the turn of the 19th Century (Nicola M.R. Oswald). Each of these notes serves as an essentially self-contained introduction to the topic. The reader gets a thorough impression of Diophantine Analysis by its central results, relevant

applications and open problems. The notes are complemented with many references and an extensive register which makes it easy to navigate through the book.

Diophantine number theory is an active area that has seen tremendous growth over the past century, and in this theory unit equations play a central role. This comprehensive treatment is the first volume devoted to these equations. The authors gather together all the most important results and look at many different aspects, including effective results on unit equations over number fields, estimates on the number of solutions, analogues for function fields and effective results for unit equations over finitely generated domains. They also present a variety of applications. Introductory chapters provide the necessary background in algebraic number theory and function field theory, as well as an account of the required tools from Diophantine approximation and transcendence theory. This makes the book suitable for young researchers as well as experts who are looking for an up-to-date overview of the field.

Diophantine Equations

Quadratic Diophantine Equations

Hilbert's Tenth Problem

Exponential Diophantine Equations

Quadratics

The Algorithmic Resolution of Diophantine Equations

This is an introduction to diophantine geometry at the advanced graduate level. The book contains a proof of the Mordell conjecture which will make it quite attractive to graduate students and professional mathematicians. In each part of the book, the reader will find numerous exercises.

This book deals with several aspects of what is now called "explicit number theory." The central theme is the solution of Diophantine equations, i.e., equations or systems of polynomial equations which must be solved in integers, rational numbers or more generally in algebraic numbers. This theme, in particular, is the central motivation for the modern theory of arithmetic algebraic geometry. In this text, this is considered through three of its most basic aspects. The local aspect, global aspect, and the third aspect is the theory of zeta and L-functions. This last aspect can be considered as a unifying theme for the whole subject.

An Introduction to Diophantine Equations

A Problem-Based Approach

The Genesis of the Langlands Program