
Read Book The Book Of Numbers John H Conway

When people should go to the books stores, search creation by shop, shelf by shelf, it is truly problematic. This is why we give the book compilations in this website. It will enormously ease you to see guide **The Book Of Numbers John H Conway** as you such as.

By searching the title, publisher, or authors of guide you truly want, you can discover them rapidly. In the house, workplace, or perhaps in your method can be all best place within net connections. If you objective to download and install the The Book Of Numbers John H Conway, it is unconditionally easy then, past currently we extend the belong to to purchase and make bargains to download and install The Book Of Numbers John H Conway so simple!

KEY=H - KAEL GIOVANNA

The Book of Numbers

Springer Science & Business Media "...the great feature of the book is that anyone can read it without excessive head scratching...You'll find plenty here to keep you occupied, amused, and informed. Buy, dip in, wallow." -IAN STEWART, **NEW SCIENTIST** "...a delightful look at numbers and their roles in everything from language to flowers to the imagination." -**SCIENCE NEWS** "...a fun and fascinating tour of numerical topics and concepts. It will have readers contemplating ideas they might never have thought were understandable or even possible." -**WISCONSIN BOOKWATCH** "This popularization of number theory looks like another classic." -**LIBRARY JOURNAL**

On Numbers and Games

CRC Press **ONAG**, as the book is commonly known, is one of those rare publications that sprang to life in a moment of creative energy and has remained influential for over a quarter of a century. Originally written to define the relation between the theories of transfinite numbers and mathematical games, the resulting work is a mathematically sophisticated but eminently enjoyable guide to game theory. By defining numbers as the strengths of positions in certain games, the author arrives at a new class, the surreal numbers, that includes both real numbers and ordinal

numbers. These surreal numbers are applied in the author's mathematical analysis of game strategies. The additions to the Second Edition present recent developments in the area of mathematical game theory, with a concentration on surreal numbers and the additive theory of partizan games.

Genius At Play

The Curious Mind of John Horton Conway

Bloomsbury Publishing USA Inside the eccentric world of John Horton Conway, gifted polymath and inventor of the Game of Life.

The Sensual (quadratic) Form

American Mathematical Soc. John Horton Conway's unique approach to quadratic forms was the subject of the Hedrick Lectures that he gave in August of 1991 at the Joint Meetings of the Mathematical Association of America and the American Mathematical Society in Orono, Maine. This book presents the substance of those lectures. The book should not be thought of as a serious textbook on the theory of quadratic forms. It consists rather of a number of essays on particular aspects of quadratic forms that have interested the author. The lectures are self-contained and will be accessible to the generally informed reader who has no particular background in quadratic form theory. The minor exceptions should not interrupt the flow of ideas. The afterthoughts to the lectures contain discussion of related matters that occasionally presuppose greater knowledge.

Regular Algebra and Finite Machines

Courier Corporation A world-famous mathematician explores Moore's theory of experiments, Kleene's theory of regular events and expressions, differential calculus of events, the factor matrix, theory of operators, much more. Solutions. 1971 edition.

On Quaternions and Octonions

CRC Press **This book investigates the geometry of quaternion and octonion algebras. Following a comprehensive historical introduction, the book illuminates the special properties of 3- and 4-dimensional Euclidean spaces using quaternions, leading to enumerations of the corresponding finite groups of symmetries. The second half of the book discusses the less f**

Winning Ways for Your Mathematical Plays

CRC Press **This classic on games and how to play them intelligently is being re-issued in a new, four volume edition. This book has laid the foundation to a mathematical approach to playing games. The wise authors wield witty words, which wangle wonderfully winning ways. In Volume 1, the authors do the Spade Work, presenting theories and techniques to "dissect" games of varied structures and formats in order to develop winning strategies.**

Sphere Packings, Lattices and Groups

Springer Science & Business Media **The second edition of this timely, definitive, and popular book continues to pursue the question: what is the most efficient way to pack a large number of equal spheres in n-dimensional Euclidean space? The authors also continue to examine related problems such as the kissing number problem, the covering problem, the quantizing problem, and the classification of lattices and quadratic forms. Like the first edition, the second edition describes the applications of these questions to other areas of mathematics and science such as number theory, coding theory, group theory, analog-to-digital conversion and data compression, n-dimensional crystallography, and dual theory and superstring theory in physics. Results as of 1992 have been added to the text, and the extensive bibliography - itself a contribution to the field - is supplemented with approximately 450 new entries.**

The Symmetries of Things

CRC Press **Start with a single shape. Repeat it in some way-translation, reflection over a line, rotation around a point-and you have created symmetry. Symmetry is a fundamental phenomenon in art, science, and nature that has been captured, described, and analyzed using mathematical concepts for a long time. Inspired by the geometric intuition of Bill Thurston**

On Numbers and Games

CRC Press **ONAG, as the book is commonly known, is one of those rare publications that sprang to life in a moment of creative energy and has remained influential for over a quarter of a century. Originally written to define the relation between the theories of transfinite numbers and mathematical games, the resulting work is a mathematically sophisticated but eminently enjoyable guide to game theory. By defining numbers as the strengths of positions in certain games, the author arrives at a new class, the surreal numbers, that includes both real numbers and ordinal numbers. These surreal numbers are applied in the author's mathematical analysis of game strategies. The additions to the Second Edition present recent developments in the area of mathematical game theory, with a concentration on surreal numbers and the additive theory of partizan games.**

Surreal Numbers

How Two Ex-students Turned on to Pure Mathematics and Found Total Happiness : a Mathematical Novelette

Addison-Wesley Professional **Nearly 30 years ago, John Horton Conway introduced a new way to construct numbers. Donald E. Knuth, in appreciation of this revolutionary system, took a week off from work on The Art of Computer Programming to write an introduction to Conway's method. Never content with the ordinary, Knuth wrote this**

introduction as a work of fiction--a novelette. If not a steamy romance, the book nonetheless shows how a young couple turned on to pure mathematics and found total happiness. The book's primary aim, Knuth explains in a postscript, is not so much to teach Conway's theory as to teach how one might go about developing such a theory. He continues: Therefore, as the two characters in this book gradually explore and build up Conway's number system, I have recorded their false starts and frustrations as well as their good ideas. I wanted to give a reasonably faithful portrayal of the important principles, techniques, joys, passions, and philosophy of mathematics, so I wrote the story as I was actually doing the research myself.... It is an astonishing feat of legerdemain. An empty hat rests on a table made of a few axioms of standard set theory. Conway waves two simple rules in the air, then reaches into almost nothing and pulls out an infinitely rich tapestry of numbers that form a real and closed field. Every real number is surrounded by a host of new numbers that lie closer to it than any other real value does. The system is truly surreal. quoted from Martin Gardner, *Mathematical Magic Show*, pp. 16--19 *Surreal Numbers*, now in its 13th printing, will appeal to anyone who might enjoy an engaging dialogue on abstract mathematical ideas, and who might wish to experience how new mathematics is created. 0201038129B04062001

Atlas of Finite Groups

Maximal Subgroups and Ordinary Characters for Simple Groups

Oxford University Press This atlas covers groups from the families of the classification of finite simple groups. Recently updated incorporating corrections

Winning Ways for Your Mathematical Plays, Volume 3

CRC Press In the quarter of a century since three mathematicians and game theorists collaborated to create *Winning Ways for Your Mathematical Plays*, the book has become the definitive work on the subject of mathematical games. Now carefully revised and broken down into four volumes to accommodate new developments, the Second Edition

retains the original's wealth of wit and wisdom. The authors' insightful strategies, blended with their witty and irreverent style, make reading a profitable pleasure. In Volume 3, the authors examine Games played in Clubs, giving case studies for coin and paper-and-pencil games, such as Dots-and-Boxes and Nimstring. From the Table of Contents: - Turn and Turn About - Chips and Strips - Dots-and-Boxes - Spots and Sprouts - The Emperor and His Money - The King and the Consumer - Fox and Geese; Hare and Hounds - Lines and Squares

Algebraic Number Theory and Fermat's Last Theorem

Third Edition

CRC Press 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 an upper level textbook, it

Winning Ways for Your Mathematical Plays

CRC Press In the quarter of a century since three mathematicians and game theorists collaborated to create **Winning Ways for Your Mathematical Plays**, the book has become the definitive work on the subject of mathematical games. Now carefully revised and broken down into four volumes to accommodate new developments, the Second Edition retains the original's wealth of wit and wisdom. The authors' insightful strategies, blended with their witty and irreverent style, make reading a profitable pleasure. In Volume 2, the authors have a Change of Heart, bending the rules established in Volume 1 to apply them to games such as Cut-cake and Loopy Hackenbush. From the Table of Contents: - If You Can't Beat 'Em, Join 'Em! - Hot Bottles Followed by Cold Wars - Games Infinite and Indefinite - Games Eternal--Games Entailed - Survival in the Lost World

Which Numbers Are Real?

American Mathematical Soc. **Everyone knows the real numbers, those fundamental quantities that make possible all of mathematics from high school algebra and Euclidean geometry through the Calculus and beyond; and also serve as the basis for measurement in science, industry, and ordinary life. This book surveys alternative real number systems: systems that generalize and extend the real numbers yet stay close to these properties that make the reals central to mathematics. Alternative real numbers include many different kinds of numbers, for example multidimensional numbers (the complex numbers, the quaternions and others), infinitely small and infinitely large numbers (the hyperreal numbers and the surreal numbers), and numbers that represent positions in games (the surreal numbers). Each system has a well-developed theory, including applications to other areas of mathematics and science, such as physics, the theory of games, multi-dimensional geometry, and formal logic. They are all active areas of current mathematical research and each has unique features, in particular, characteristic methods of proof and implications for the philosophy of mathematics, both highlighted in this book. Alternative real number systems illuminate the central, unifying role of the real numbers and include some exciting and eccentric parts of mathematics. Which Numbers Are Real? Will be of interest to anyone with an interest in numbers, but specifically to upper-level undergraduates, graduate students, and professional mathematicians, particularly college mathematics teachers.**

How to Solve It

A New Aspect of Mathematical Method

Princeton University Press **A perennial bestseller by eminent mathematician G. Polya, How to Solve It will show anyone in any field how to think straight. In lucid and appealing prose, Polya reveals how the mathematical method of demonstrating a proof or finding an unknown can be of help in attacking any problem that can be "reasoned" out—from building a bridge to winning a game of anagrams. Generations of readers have relished Polya's deft—indeed, brilliant—instructions on stripping away irrelevancies and going straight to the heart of the problem.**

The Ultimate Challenge

The $3x+1$ Problem

American Mathematical Soc. **The $3x+1$ problem, or Collatz problem, concerns the following seemingly innocent arithmetic procedure applied to integers: If an integer x is odd then "multiply by three and add one", while if it is even then "divide by two". The $3x+1$ problem asks whether, starting from any positive integer, repeating this procedure over and over will eventually reach the number 1. Despite its simple appearance, this problem is unsolved. Generalizations of the problem are known to be undecidable, and the problem itself is believed to be extraordinarily difficult. This book reports on what is known on this problem. It consists of a collection of papers, which can be read independently of each other. The book begins with two introductory papers, one giving an overview and current status, and the second giving history and basic results on the problem. These are followed by three survey papers on the problem, relating it to number theory and dynamical systems, to Markov chains and ergodic theory, and to logic and the theory of computation. The next paper presents results on probabilistic models for behavior of the iteration. This is followed by a paper giving the latest computational results on the problem, which verify its truth for $x \leq 5.4 \cdot 10^{18}$. The book also reprints six early papers on the problem and related questions, by L. Collatz, J. H. Conway, H. S. M. Coxeter, C. J. Everett, and R. K. Guy, each with editorial commentary. The book concludes with an annotated bibliography of work on the problem up to the year 2000.**

Steps into Analytic Number Theory

A Problem-Based Introduction

Springer Nature **This problem book gathers together 15 problem sets on analytic number theory that can be profitably approached by anyone from advanced high school students to those pursuing graduate studies. It emerged from a 5-week course taught by the first author as part of the 2019 Ross/Asia Mathematics Program held from July 7 to August 9 in Zhenjiang, China. While it is recommended that the reader has a solid background in mathematical problem solving**

(as from training for mathematical contests), no possession of advanced subject-matter knowledge is assumed. Most of the solutions require nothing more than elementary number theory and a good grasp of calculus. Problems touch at key topics like the value-distribution of arithmetic functions, the distribution of prime numbers, the distribution of squares and nonsquares modulo a prime number, Dirichlet's theorem on primes in arithmetic progressions, and more. This book is suitable for any student with a special interest in developing problem-solving skills in analytic number theory. It will be an invaluable aid to lecturers and students as a supplementary text for introductory Analytic Number Theory courses at both the undergraduate and graduate level.

Winning Ways for Your Mathematical Plays, Volume 4

A K Peters/CRC Press This is a text on mathematical games and how to play them intelligently. In this volume, the authors present a Diamond of a find, cover one-player games such as Solitaire, and ponder questions like What is life?

Winning Ways for Your Mathematical Plays

Zahlr. Graph. Darst

An Illustrated Theory of Numbers

American Mathematical Soc. **News about this title:** — Author Marty Weissman has been awarded a Guggenheim Fellowship for 2020. (Learn more here.) — Selected as a 2018 CHOICE Outstanding Academic Title — 2018 PROSE Awards Honorable Mention **An Illustrated Theory of Numbers** gives a comprehensive introduction to number theory, with complete proofs, worked examples, and exercises. Its exposition reflects the most recent scholarship in mathematics and its history. Almost 500 sharp illustrations accompany elegant proofs, from prime decomposition through quadratic reciprocity. Geometric and dynamical arguments provide new insights, and allow for a rigorous approach with less algebraic manipulation. The final chapters contain an extended treatment of binary quadratic forms, using Conway's topograph to solve quadratic Diophantine equations (e.g., Pell's equation) and to study reduction and the finiteness of class numbers. Data visualizations introduce the reader to open questions and cutting-edge results in analytic number

theory such as the Riemann hypothesis, boundedness of prime gaps, and the class number 1 problem. Accompanying each chapter, historical notes curate primary sources and secondary scholarship to trace the development of number theory within and outside the Western tradition. Requiring only high school algebra and geometry, this text is recommended for a first course in elementary number theory. It is also suitable for mathematicians seeking a fresh perspective on an ancient subject.

Illustrating Mathematics

American Mathematical Soc. This book is for anyone who wishes to illustrate their mathematical ideas, which in our experience means everyone. It is organized by material, rather than by subject area, and purposefully emphasizes the process of creating things, including discussions of failures that occurred along the way. As a result, the reader can learn from the experiences of those who came before, and will be inspired to create their own illustrations. Topics illustrated within include prime numbers, fractals, the Klein bottle, Borromean rings, tilings, space-filling curves, knot theory, billiards, complex dynamics, algebraic surfaces, groups and prime ideals, the Riemann zeta function, quadratic fields, hyperbolic space, and hyperbolic 3-manifolds. Everyone who opens this book should find a type of mathematics with which they identify. Each contributor explains the mathematics behind their illustration at an accessible level, so that all readers can appreciate the beauty of both the object itself and the mathematics behind it.

An Interpretive Introduction to Quantum Field Theory

Princeton University Press Quantum mechanics is a subject that has captured the imagination of a surprisingly broad range of thinkers, including many philosophers of science. Quantum field theory, however, is a subject that has been discussed mostly by physicists. This is the first book to present quantum field theory in a manner that makes it accessible to philosophers. Because it presents a lucid view of the theory and debates that surround the theory, *An Interpretive Introduction to Quantum Field Theory* will interest students of physics as well as students of philosophy. Paul Teller presents the basic ideas of quantum field theory in a way that is understandable to readers who are familiar with non-relativistic quantum mechanics. He provides information about the physics of the theory without calculational detail, and he enlightens readers on how to think about the theory physically. Along the way, he dismantles some popular myths and clarifies the novel ways in which quantum field theory is both a theory about fields

and about particles. His goal is to raise questions about the philosophical implications of the theory and to offer some tentative interpretive views of his own. This provocative and thoughtful book challenges philosophers to extend their thinking beyond the realm of quantum mechanics and it challenges physicists to consider the philosophical issues that their explorations have encouraged.

The Knot Book

An Elementary Introduction to the Mathematical Theory of Knots

American Mathematical Soc. **Knots are familiar objects. We use them to moor our boats, to wrap our packages, to tie our shoes. Yet the mathematical theory of knots quickly leads to deep results in topology and geometry. The Knot Book is an introduction to this rich theory, starting from our familiar understanding of knots and a bit of college algebra and finishing with exciting topics of current research. The Knot Book is also about the excitement of doing mathematics. Colin Adams engages the reader with fascinating examples, superb figures, and thought-provoking ideas. He also presents the remarkable applications of knot theory to modern chemistry, biology, and physics. This is a compelling book that will comfortably escort you into the marvelous world of knot theory. Whether you are a mathematics student, someone working in a related field, or an amateur mathematician, you will find much of interest in The Knot Book.**

The Book of Numbers

Copernicus "...the great feature of the book is that anyone can read it without excessive head scratching...You'll find plenty here to keep you occupied, amused, and informed. Buy, dip in, wallow." -IAN STEWART, NEW SCIENTIST "...a delightful look at numbers and their roles in everything from language to flowers to the imagination." -SCIENCE NEWS "...a fun and fascinating tour of numerical topics and concepts. It will have readers contemplating ideas they might never have thought were understandable or even possible." -WISCONSIN BOOKWATCH "This popularization of number

theory looks like another classic." -LIBRARY JOURNAL

Games of No Chance

Cambridge University Press **Is Nine-Men Morris, in the hands of perfect players, a win for white or for black - or a draw? Can king, rook, and knight always defeat king and two knights in chess? What can Go players learn from economists? What are nimbers, tinies, switches and minies? This book deals with combinatorial games, that is, games not involving chance or hidden information. Their study is at once old and young: though some games, such as chess, have been analyzed for centuries, the first full analysis of a nontrivial combinatorial game (Nim) only appeared in 1902. The first part of this book will be accessible to anyone, regardless of background: it contains introductory expositions, reports of unusual tournaments, and a fascinating article by John H. Conway on the possibly everlasting contest between an angel and a devil. For those who want to delve more deeply, the book also contains combinatorial studies of chess and Go; reports on computer advances such as the solution of Nine-Men Morris and Pentominoes; and theoretical approaches to such problems as games with many players. If you have read and enjoyed Martin Gardner, or if you like to learn and analyze new games, this book is for you.**

A Course in Functional Analysis

Springer **This book is an introductory text in functional analysis. Unlike many modern treatments, it begins with the particular and works its way to the more general. From the reviews: "This book is an excellent text for a first graduate course in functional analysis....Many interesting and important applications are included....It includes an abundance of exercises, and is written in the engaging and lucid style which we have come to expect from the author." --**

MATHEMATICAL REVIEWS

Crocheting Adventures with Hyperbolic Planes

Tactile Mathematics, Art and Craft for all to Explore, Second Edition

CRC Press Winner, Euler Book Prize, awarded by the Mathematical Association of America. With over 200 full color photographs, this non-traditional, tactile introduction to non-Euclidean geometries also covers early development of geometry and connections between geometry, art, nature, and sciences. For the crafter or would-be crafter, there are detailed instructions for how to crochet various geometric models and how to use them in explorations. New to the 2nd Edition; Daina Taimina discusses her own adventures with the hyperbolic planes as well as the experiences of some of her readers. Includes recent applications of hyperbolic geometry such as medicine, architecture, fashion & quantum computing.

Unsolved Problems in Geometry

New York : Springer-Verlag For mathematicians or others who wish to keep up to date with the state of the art of geometrical problems, this collection of problems that are easy to state and understand but are as yet unsolved covers a wide variety of topics including convex sets, polyhedra, packing and covering, tiling, and combinatorial problems. Annotation copyrighted by Book News, Inc., Portland, OR.

Queen of Thieves

The True Story of "Marm" Mandelbaum and Her Gangs of New York

Simon and Schuster The true story of a Jewish criminal matriarch and fence who rose to power during New York City's Gilded Age. Queen of Thieves is the gritty, fast-paced story of Fredericka "Marm" Mandelbaum, a poor Jewish woman

who rose to the top of her profession in organized crime during the Gilded Age in New York City. During her more than twenty-five-year reign as the country's top receiver of stolen goods, she accumulated great wealth and power inconceivable for women engaged in business, legitimate or otherwise. The New York Times called Mandelbaum "the nucleus and center of the whole organization of crime in New York City." Having emigrated from Germany in 1850, she began her climb to the top of the crime world as a peddler on the rough-and-tumble, crowded streets of the city. By 1880, she had amassed a fortune estimated at more than \$1 million. Mandelbaum was known for running an orderly criminal enterprise. She enlisted the services of an extensive network of criminals of every ilk and bribed police officials, politicians, and judges. If someone wanted to move stolen goods, needed protection from the law, or sought money to finance a caper, Marm was the person to see. In 1884, Mandelbaum escaped from the clutches of Pinkerton detectives, who were casing her house, and fled to Canada. Mandelbaum lived out the rest of her life in luxury on a small farm with her family and ill-got fortune. Hundreds of people turned out for her funeral. Dozens of people later reported to police that they had their pockets picked at the service. "A provocative read and a pleasing window into nineteenth-century crime with an unusual leader—an immigrant woman. Recommended for historical crime buffs, those interested in women's history, and the general reader." —Library Journal "Queen of Thieves, like Conway's previous books, paints a vivid and cinematic picture of New York City during the Gilded Age with its colorful cast of characters. This time, the story centers on one of America's first organized crime bosses, Fredericka Mandelbaum, a woman who gained enormous money and power during her rise as matriarch of the underworld." —Will Staples, screenwriter "Mr. Conway, true to his roots a newspaperman, has written a gripping, page-turning historical account of Fredericka Mandelbaum, making it as fresh and relevant as if it were ripped from today's headlines." —Jesse Dubuc, coauthor, *The Attack of the HMS Nimrod: Wareham and the War of 1812*

Five-Minute Crimebusters

Clever Mini-Mysteries

Sterling Publishing Company, Inc. Gathers several unsolved mysteries, from stolen diamonds to a New Year's Eve murder, and gives subtle clues that lead to the solution of the crimes.

A Course in Abstract Analysis

American Mathematical Soc. **This book covers topics appropriate for a first-year graduate course preparing students for the doctorate degree. The first half of the book presents the core of measure theory, including an introduction to the Fourier transform. This material can easily be covered in a semester. The second half of the book treats basic functional analysis and can also be covered in a semester. After the basics, it discusses linear transformations, duality, the elements of Banach algebras, and C*-algebras. It concludes with a characterization of the unitary equivalence classes of normal operators on a Hilbert space. The book is self-contained and only relies on a background in functions of a single variable and the elements of metric spaces. Following the author's belief that the best way to learn is to start with the particular and proceed to the more general, it contains numerous examples and exercises.**

The New York Times Book of Mathematics

More Than 100 Years of Writing by the Numbers

Sterling Publishing Company Incorporated **Presents a selection from the archives of the New York newspaper of its writings on mathematics from 1892 to 2010, covering such topics as chaos theory, statistics, cryptography, and computers.**

Episodes from the Early History of Mathematics

MAA **Among other things, Aaboe shows us how the Babylonians did calculations, how Euclid proved that there are infinitely many primes, how Ptolemy constructed a trigonometric table in his Almagest, and how Archimedes trisected the angle.**

On Numbers and Games

Shipwrecks of the Outer Banks

Dramatic Rescues and Fantastic Wrecks in the Graveyard of the Atlantic

Rowman & Littlefield More than 6,000 ships have met their doom in the waters along the North Carolina coast, weaving a rich history of tragedy, drama and heroics along these picturesque beaches. Men have lost their lives and fortunes, and heroes have been made where the combination of mixing currents, treacherous coastline and shifting underwater sandbars spells disaster for even the most seasoned sailor. These are the stories of daring rescues, tragic failures, enduring mysteries, buried treasure, and fascinating legend.

The Historical Roots of Elementary Mathematics

Courier Corporation Exciting, hands-on approach to understanding fundamental underpinnings of modern arithmetic, algebra, geometry and number systems examines their origins in early Egyptian, Babylonian, and Greek sources.

Quaternion Algebras

Springer Nature This open access textbook presents a comprehensive treatment of the arithmetic theory of quaternion algebras and orders, a subject with applications in diverse areas of mathematics. Written to be accessible and approachable to the graduate student reader, this text collects and synthesizes results from across the literature. Numerous pathways offer explorations in many different directions, while the unified treatment makes this book an essential reference for students and researchers alike. Divided into five parts, the book begins with a basic introduction to the noncommutative algebra underlying the theory of quaternion algebras over fields, including the relationship to quadratic forms. An in-depth exploration of the arithmetic of quaternion algebras and orders follows. The third part considers analytic aspects, starting with zeta functions and then passing to an idelic approach, offering

a pathway from local to global that includes strong approximation. Applications of unit groups of quaternion orders to hyperbolic geometry and low-dimensional topology follow, relating geometric and topological properties to arithmetic invariants. Arithmetic geometry completes the volume, including quaternionic aspects of modular forms, supersingular elliptic curves, and the moduli of QM abelian surfaces. Quaternion Algebras encompasses a vast wealth of knowledge at the intersection of many fields. Graduate students interested in algebra, geometry, and number theory will appreciate the many avenues and connections to be explored. Instructors will find numerous options for constructing introductory and advanced courses, while researchers will value the all-embracing treatment. Readers are assumed to have some familiarity with algebraic number theory and commutative algebra, as well as the fundamentals of linear algebra, topology, and complex analysis. More advanced topics call upon additional background, as noted, though essential concepts and motivation are recapped throughout.

2019-20 MATRIX Annals

Springer Nature **MATRIX** is Australia's international and residential mathematical research institute. It facilitates new collaborations and mathematical advances through intensive residential research programs, each 1-4 weeks in duration. This book is a scientific record of the ten programs held at MATRIX in 2019 and the two programs held in January 2020: · Topology of Manifolds: Interactions Between High and Low Dimensions · Australian-German Workshop on Differential Geometry in the Large · Aperiodic Order meets Number Theory · Ergodic Theory, Diophantine Approximation and Related Topics · Influencing Public Health Policy with Data-informed Mathematical Models of Infectious Diseases · International Workshop on Spatial Statistics · Mathematics of Physiological Rhythms · Conservation Laws, Interfaces and Mixing · Structural Graph Theory Downunder · Tropical Geometry and Mirror Symmetry · Early Career Researchers Workshop on Geometric Analysis and PDEs · Harmonic Analysis and Dispersive PDEs: Problems and Progress The articles are grouped into peer-reviewed contributions and other contributions. The peer-reviewed articles present original results or reviews on a topic related to the MATRIX program; the remaining contributions are predominantly lecture notes or short articles based on talks or activities at MATRIX.