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The systematic study of number theory was initiated around 300B.C. when Euclid proved that there are innitely many prime numbers, and also cleverly deduced the fundamental theorem of arithmetic, which asserts that every positive

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Elementary Number Theory: Primes, Congruences, and Secrets

Student Learning Outcomes: Students will prove theorems and solve problems in number theory, and communicate their results orally and in

writing. Required Materials: Number Theory Through Inquiry by David C. Marshall, Ed-ward Odell, and Michael Starbird, Mathematical Association of America Textbooks, 2007, ISBN-10: 0883857510, ISBN-13: 978 ...

Introduction to Number Theory

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Number Theory Through Inquiry Solutions Manual

Number Theory Through Inquiry, by Marshall, Odell, and Starbird, Chs. 1-5. This book differs from other texts for proof-based courses, in that the proofs of the theorems are not included. The

point of this is for you, the student, to fill in these details, in order to be more actively involved with the material.

Elementary Number Theory - UTEP MATHEMATICS

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This innovative textbook leads students on a carefully guided discovery of introductory number theory. The book has two equally significant goals. The first is to help students develop mathematical thinking

skills, particularly theorem-proving skills. The other goal is to help students understand some of the wonderfully rich ideas in the mathematical study of numbers. This book is appropriate for a proof transitions course, for independent study, or for a course designed as an introduction to abstract mathematics. It

is designed to be used with an instructional technique variously called guided discovery or Modified Moore Method or Inquiry Based Learning (IBL). Instructors' materials explain the instructional method, which gives students a totally different experience compared to a standard lecture course. Students

develop an attitude of personal reliance and a sense that they can think effectively about difficult problems; goals that are fundamental to the educational enterprise within and beyond mathematics.

Number Theory Through Inquiry is an innovative textbook that leads students on a

carefully guided discovery of introductory number theory. The book has two equally significant goals. One goal is to help students develop mathematical thinking skills, particularly, theorem-proving skills. The other goal is to help students understand some of the wonderfully rich ideas in the

mathematical study of numbers. This book is appropriate for a proof transitions course, for an independent study experience, or for a course designed as an introduction to abstract mathematics. Math or related majors, future teachers, and students or adults interested in exploring mathematical ideas on their own will

enjoy Number Theory Through Inquiry. Number theory is the perfect topic for an introduction-to-proofs course. Every college student is familiar with basic properties of numbers, and yet the exploration of those familiar numbers leads us to a rich landscape of ideas. Number Theory Through Inquiry

contains a carefully arranged sequence of challenges that lead students to discover ideas about numbers and to discover methods of proof on their own. It is designed to be used with an instructional technique variously called guided discovery or Modified Moore Method or Inquiry Based Learning (IBL).

Instructors' materials explain the instructional method. This style of instruction gives students a totally different experience compared to a standard lecture course. Here is the effect of this experience: Students learn to think independently: they learn to depend on their own reasoning to

determine right from wrong; and they develop the central, important ideas of introductory number theory on their own. From that experience, they learn that they can personally create important ideas, and they develop an attitude of personal reliance and a sense that they can think effectively about

difficult problems. These goals are fundamental to the educational enterprise within and beyond mathematics.

Topology Through Inquiry is a comprehensive introduction to point-set, algebraic, and geometric topology, designed to support inquiry-based

learning (IBL) courses for upper-division undergraduate or beginning graduate students. The book presents an enormous amount of topology, allowing an instructor to choose which topics to treat. The point-set material contains many interesting topics well beyond the basic core, including continua and

metrizability. Geometric and algebraic topology topics include the classification of 2-manifolds, the fundamental group, covering spaces, and homology (simplicial and singular). A unique feature of the introduction to homology is to convey a clear geometric motivation by starting

with mod 2 coefficients. The authors are acknowledged masters of IBL-style teaching. This book gives students joy-filled, manageable challenges that incrementally develop their knowledge and skills. The exposition includes insightful framing of fruitful points of view as well as advice on effective

thinking and learning. The text presumes only a modest level of mathematical maturity to begin, but students who work their way through this text will grow from mathematics students into mathematicians. Michael Starbird is a University of Texas Distinguished Teaching Professor of

Mathematics. Among his works are two other co-authored books in the Mathematical Association of America's (MAA) Textbook series. Francis Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College and a past president of the MAA. Both authors are award-winning teachers,

including each having received the MAA's Haimo Award for distinguished teaching. Starbird and Su are, jointly and individually, on lifelong missions to make learning—of mathematics and beyond—joyful, effective, and available to everyone. This book invites topology students and teachers to

join in the adventure.

Number Theory is a newly translated and revised edition of the most popular introductory textbook on the subject in Hungary. The book covers the usual topics of introductory number theory: divisibility, primes, Diophantine equations, arithmetic

functions, and so on. It also introduces several more advanced topics including congruences of higher degree, algebraic number theory, combinatorial number theory, primality testing, and cryptography. The development is carefully laid out with ample illustrative examples and a treasure trove of

beautiful and challenging problems. The exposition is both clear and precise. The book is suitable for both graduate and undergraduate courses with enough material to fill two or more semesters and could be used as a source for independent study and capstone projects. Freud and Gyarmati are well-

known mathematicians and mathematical educators in Hungary, and the Hungarian version of this book is legendary there. The authors' personal pedagogical style as a facet of the rich Hungarian tradition shines clearly through. It will inspire and exhilarate readers.

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.

Right triangles are at the heart of this textbook's vibrant new approach to elementary number theory. Inspired by the familiar Pythagorean theorem, the author invites the reader to ask

natural arithmetic questions about right triangles, then proceeds to develop the theory needed to respond. Throughout, students are encouraged to engage with the material by posing questions, working through exercises, using technology, and learning about the broader context in which ideas

developed. Progressing from the fundamentals of number theory through to Gauss sums and quadratic reciprocity, the first part of this text presents an innovative first course in elementary number theory. The advanced topics that follow, such as counting lattice points and the four squares theorem, offer a

variety of options for extension, or a higher-level course; the breadth and modularity of the later material is ideal for creating a senior capstone course. Numerous exercises are included throughout, many of which are designed for SageMath. By involving students in the active process of inquiry and

investigation, this textbook imbues the foundations of number theory with insights into the lively mathematical process that continues to advance the field today. Experience writing proofs is the only formal prerequisite for the book, while a background in basic real analysis will enrich the reader's appreciation of

the final chapters.

Hilbert's tenth problem is one of 23 problems proposed by David Hilbert in 1900 at the International Congress of Mathematicians in Paris. These problems gave focus for the exponential development of mathematical thought over the following

century. The tenth problem asked for a general algorithm to determine if a given Diophantine equation has a solution in integers. It was finally resolved in a series of papers written by Julia Robinson, Martin Davis, Hilary Putnam, and finally Yuri Matiyasevich in 1970. They showed that no

such algorithm exists. This book is an exposition of this remarkable achievement. Often, the solution to a famous problem involves formidable background. Surprisingly, the solution of Hilbert's tenth problem does not. What is needed is only some elementary number theory and

rudimentary logic. In this book, the authors present the complete proof along with the romantic history that goes with it. Along the way, the reader is introduced to Cantor's transfinite numbers, axiomatic set theory, Turing machines, and Gödel's incompleteness theorems. Copious exercises are included at

the end of each chapter to guide the student gently on this ascent. For the advanced student, the final chapter highlights recent developments and suggests future directions. The book is suitable for undergraduates and graduate students. It is essentially self-contained.

This manual is written to accompany Mathematical Interest Theory, by Leslie Jane Federer Vaaler and James Daniel. It includes detailed solutions to the odd-numbered problems. There are solutions to 239 problems, and sometimes more than one way to reach the

answer is presented. In keeping with the presentation of the text, calculator discussions for the Texas Instruments BA II Plus or BA II Plus Professional calculator is typeset in a different font from the rest of the text.

Designed for precollege teachers by a

collaborative of teachers, educators, and mathematicians, Famous Functions in Number Theory is based on a course offered in the Summer School Teacher Program at the Park City Mathematics Institute. But this book isn't a "course" in the traditional sense. It consists of a carefully sequenced collection of

problem sets designed to develop several interconnected mathematical themes, and one of the goals of the problem sets is for readers to uncover these themes for themselves. Famous Functions in Number Theory introduces readers to the use of formal algebra in number theory. Through numerical experiments,

participants learn how to use polynomial algebra as a bookkeeping mechanism that allows them to count divisors, build multiplicative functions, and compile multiplicative functions in a certain way that produces new ones. One capstone of the investigations is a beautiful result attributed to Fermat that

determines the number of ways a positive integer can be written as a sum of two perfect squares. Famous Functions in Number Theory is a volume of the book series "IAS/PCMI-The Teacher Program Series" published by the American Mathematical Society. Each volume in that series covers the

content of one Summer School Teacher Program year and is independent of the rest. Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute. Members of the Mathematical Association of America (MAA) and the National Council of Teachers of

Mathematics (NCTM) receive a 20% discount from list price.

This book leads readers from simple number work to the point where they can prove the classical results of elementary number theory for themselves.

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