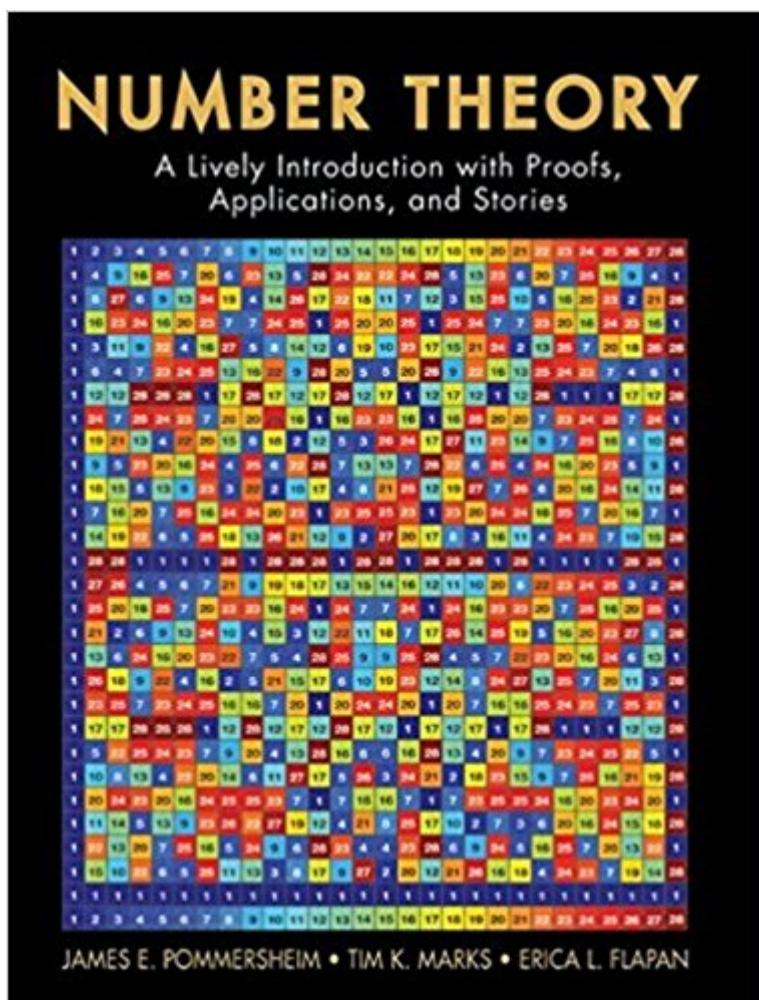


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# Number Theory: A Lively Introduction With Proofs, Applications, And Stories



## Synopsis

Number Theory: A Lively Introduction with Proofs, Applications, and Stories, is a new book that provides a rigorous yet accessible introduction to elementary number theory along with relevant applications. Readable discussions motivate new concepts and theorems before their formal definitions and statements are presented. Many theorems are preceded by Numerical Proof Previews, which are numerical examples that will help give students a concrete understanding of both the statements of the theorems and the ideas behind their proofs, before the statement and proof are formalized in more abstract terms. In addition, many applications of number theory are explained in detail throughout the text, including some that have rarely (if ever) appeared in textbooks. A unique feature of the book is that every chapter includes a math myth, a fictional story that introduces an important number theory topic in a friendly, inviting manner. Many of the exercise sets include in-depth Explorations, in which a series of exercises develop a topic that is related to the material in the section.

## Book Information

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## Customer Reviews

Can learning math actually be fun? Number Theory: A Lively Introduction with Proofs, Applications, and Stories proves it can! Number Theory: A Lively Introduction with Proofs, Applications, and Stories will introduce you to elementary number theory, helping you develop your proof writing skills while learning the core concepts in number theory as well as advanced topics used in modern applications. To help you succeed, you'll learn "math myths"â "fictional stories starring famous mathematicians that illustrate important number theory topics in a friendly, inviting manner that's

easy to understand and remember. "Numerical Proof Previews" give you a concrete way to understand the key ideas of a proof. Illustrations throughout the text add to the fun and your understanding. As accessible as the book is, it does not skimp on the serious mathematics. You'll explore: Methods of proof and the basic properties of the integers, including mathematical induction Central concepts and theorems in elementary number theory using a developmental approach, including basic divisibility properties, prime numbers, the Euclidean Algorithm, modular arithmetic (including applications), Fermat's Little Theorem, Euler's Theorem, and RSA (public-key) encryption Primitive roots, primality testing, quadratic reciprocity, Gaussian integers, Fermat's Two Squares Theorem, continued fractions, Pell's Equation, and Fermat's Last Theorem, and much more Ideal for first-timers in number theory as well as math majors and math education majors, Number Theory: A Lively Introduction with Proofs, Applications, and Stories makes learning number theory a joy!

James Pommersheim is the Katharine Piggott Professor of Mathematics at Reed College. He held post-doctoral positions at the Institute for Advanced Study, M.I.T., and U.C. Berkeley, and he served on the mathematics faculty at New Mexico State University and Pomona College. Pommersheim has published research papers in a wide variety of areas, including algebraic geometry, number theory, topology, and quantum computation. He has enjoyed teaching number theory to students at many levels: college math and math education students, talented high school students, and advanced graduate students. Pommersheim earned his Ph.D. from the University of Chicago, where he studied under William Fulton. Tim Marks is a Research Scientist at Mitsubishi Electric Research Laboratories in Cambridge, Massachusetts. Previously, he taught high school mathematics and physics for three years, and he worked for three years as a mathematics textbook editor at McDougal Littell/ Houghton Mifflin. Marks and Pommersheim have taught number theory at the Johns Hopkins University's Center for Talented Youth (CTY) summer program for 19 years. Marks earned his A.B. degree from Harvard University. He completed his Ph.D. and postdoctoral research at the University of California, San Diego. Erica Flapan joined the mathematics department at Pomona College in 1986. She held post-doctoral positions at Rice University and the University of California, Santa Barbara. Flapan has taught a wide range of mathematics courses and has numerous publications in topology and its applications to chemistry, including her book *When Topology Meets Chemistry*. She developed a course entitled "Problem Solving in the Sciences," which aims to teach students the mathematics they need in order to succeed in science and economics. Flapan obtained her Ph.D. in knot theory from the University of Wisconsin and is the

Lingurn H. Burkhead Professor of Mathematics at Pomona College.

This book is a fantastic intro to Number Theory. It's fun and engaging. It's accessible. It leads you through proofs in plain English, but with still rigorous mathematics. It doesn't give impenetrable proofs that leave out intermediate steps or require a leap of intuition that an arrogant mathematician assumes you should know. It gives real-world applications. It contains short, interesting bios on the giants in the field. It provides excellent exercises that lead you step-by-step into deeper thinking. This book is the best intro, bar none. If you have a child in the middle school or high school who likes math, this is a book they will love. The earlier a child can master these concepts, the more likely he or she will be to internalize the abstract thinking processes involved, giving a real advantage in tackling a host of problems in physics, computer science, networking, engineering, genetics and on and on. This is not to say that a 6th grader is going to pick the book up and read it cover to cover like it was Harry Potter. Some parental assistance and encouragement will be required. But, if a child has mastered this book by some point in high school, the sky is the limit. The only knock is that it does not provide answers to the exercises - the text says they can be found on the web (on the Wiley web site), but when I click on the links I have been unable to get to the answers. This should be fixed. Nevertheless, the book is truly a 5-star work. Kudos to the three authors - well done!

I'm not quite all the way finished with this, but the book is very well done. It may seem childish at times with the 'Math Myth' sections, but the material is certainly not for children. The book is easy to follow and the material builds naturally on itself with refreshers/reminders along the way.

There seems to be an unwritten rule that mathematics texts must be written in a turgid theorem/proof format where the presentation is cold and mechanical. In my opinion, many mathematics texts are snobby and elitist; written by authors who dare not stray from the mainstream by showing a sense of humor and making their subjects fun and interesting. Morris Kline wrote a very interesting book "Why the Professor Can't Teach" that goes into detail into why this approach to teaching and textbook writing has become the standard approach. I am happy to say that this textbook breaks the standard mold and makes this subject interesting and relevant. The book is also rigorous in the sense that it is still a college level mathematics textbook and not bedtime reading. The book also uses humor and cartoons effectively to teach and explain. Of course, someone with a deep interest in mathematics will have to go much further than this book and will require a more

rigorous treatment. However, this book does no harm and no one will have to unlearn anything presented here. It would be a great complement to other more standard texts on this material and is a great stepping stone for those who want an easier path to success in advanced number theory. In summary a great first book on number theory. Highly recommended !

I love this book! Took Jamie's classes before. Jamie is a fantastic professor and the book is just as fantastic as him.

Awesome book and really to the point. Highly recommended

Excelente libro, ampliamente lo recomiendo. Vale la pena leerlo completo e intentar todos los ejercicios.

It has been 50 years since I departed school, so to keep the grey cells properly exercised and stave off dementia, I am thinking this study will do the trick. So far so good. Most of the time when I do not come up with the proper results, the problem normally is ME and I spend as much time as necessary to correct my ways. But on page 275, the chart for "mars (mod 3)" is wrong, should be 0 1 2 0 1 2 0 1, etc. And on page 280, item b. the formula  $\text{lcm}(104,60)=3120$ , after spending many hours re-checking my math and finally using my little HP hand held calculator which has a lcm function, the result =1560. Maybe the authors want to force us prove our diligence. As reviewed previously, the lack of answers is frustrating and one could spend hours doing things wrong without the ability to check their work. If someone can tell me my statements are wrong, please let me know. Regards, Harroun

I am a professor of electrical engineering. I recently started working on a research project involving encryption. I assigned the task to one of my students who needed a lot of deep-math help which threw us into the ocean of group theory, finite fields, cyclotomic polynomials, oh man! You name it. I must have checked out 20 books from the library and tried to scrape one topic from this book, one from that. Wikipedia this, google that. I also desperately needed to learn deep reasons of the simplest concepts, the way gauss and legendre visualized it. Every, I mean, EVERY book, written by big shots at big schools were hopeless !!! You could learn barely two, three subjects from the best ones, since you were familiar with the subject anyway ! Due to the desperate previous attempts to learn it from other pathetic books !!!,... Then came this book. I could not put this book down.

Although the authors sometimes overdo the explanations, I am forgiving all of it. One thing is superior with this book: the authors' analogies in explaining difficult topics. Every single analogy is well thought of and nails the concept into your brain permanently. These three authors are the Euler, Gauss, and Sophie Germain of math education . They can teach my cat what a quadratic residue is. These authors should write another 50 books explaining all other difficult topics in math. We will advance 10x in this century.

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