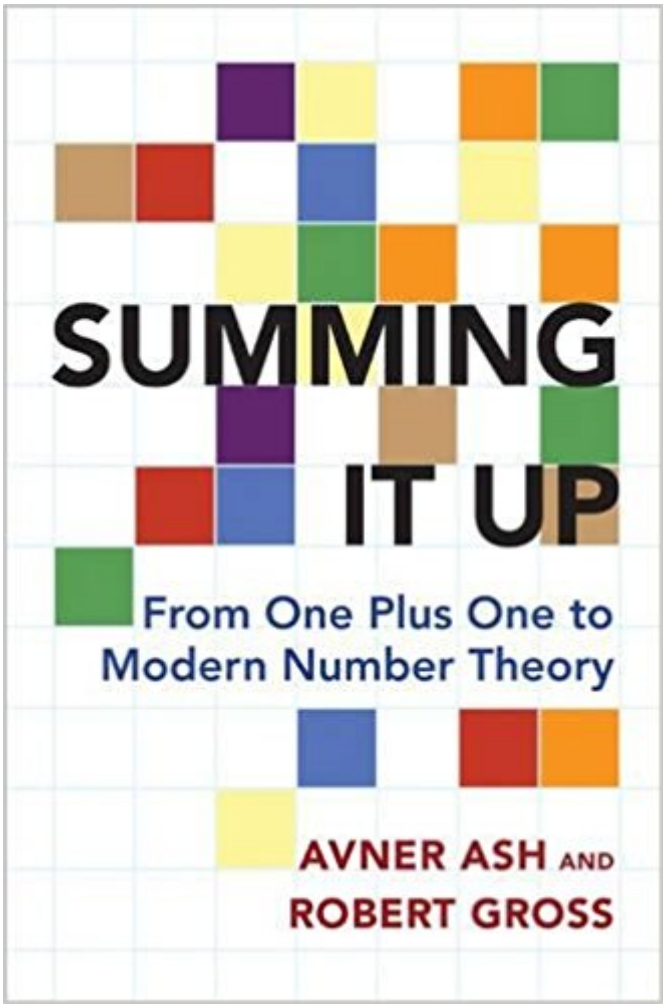
Summing It Up: From One Plus One To Modern Number Theory



Synopsis

We use addition on a daily basisÃ¢â ¬â ¢yet how many of us stop to truly consider the enormous and remarkable ramifications of this mathematical activity? Summing It Up uses addition as a springboard to present a fascinating and accessible look at numbers and number theory, and how we apply beautiful numerical properties to answer math problems. Mathematicians Avner Ash and Robert Gross explore addition's most basic characteristics as well as the addition of squares and other powers before moving onward to infinite series, modular forms, and issues at the forefront of current mathematical research.Ash and Gross tailor their succinct and engaging investigations for math enthusiasts of all backgrounds. Employing college algebra, the first part of the book examines such questions as, can all positive numbers be written as a sum of four perfect squares? The second section of the book incorporates calculus and examines infinite seriesÃ¢â ¬â ¢long sums that can only be defined by the concept of limit, as in the example of 1+1/2+1/4+. . .=? With the help of some group theory and geometry, the third section ties together the first two parts of the book through a discussion of modular formsÃ¢â ¬â ¢the analytic functions on the upper half-plane of the complex numbers that have growth and transformation properties. Ash and Gross show how modular forms are indispensable in modern number theory, for example in the proof of Fermat's Last Theorem.Appropriate for numbers novices as well as college math majors, Summing It Up delves into mathematics that will enlighten anyone fascinated by numbers.

Book Information

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Customer Reviews

"Offers a clear and beautiful progression from addition to modern number theory."--Math-Blog"The

authors did a remarkable job in making some aspects of modern number theory very accessible to readers with only a minimal knowledge of mathematics, say a student who had a first calculus course. However, also mathematicians who do not have number theory as their main focus will enjoy this book."--Adhemar Bultheel, European Mathematical Society"Ash and Gross do a masterful job of leading students from finite sums to modular forms and to the forefront of modern number theory. . . . This is an excellent piece of mathematical writing."--Choice"[A]n accessible and fun introduction to modular forms. . . . [Summing It Up] is engaging and conversational, without losing accuracy or essential rigor."--Dominic Lanphier, American Mathematical Monthly"Summing It Up uses addition as a springboard to present a fascinating and accessible look at numbers and number theory, and how we apply beautiful numerical properties to answer math problems. . . . Ash and Gross tailor their succinct and engaging investigations for math enthusiasts of all backgrounds."--L'Enseignement Mathematique"Readers of the books [Fearless Symmetry and Elliptic Tales] will not need this review to be talked into buying 'Summing it Up by the same authors, Avner Ash and Robert Gross. . . . Like the other volumes it takes the readers on a guided tour through parts of modern number theory by starting with very elementary notions. "--Franz Lemmermeyer, Zentralblatt MATH

"In Summing It Up, Ash and Gross, with their customary charm and clarity, build an impressive tower from the most basic mathematical story imaginable. They start by adding up finite sequences and whole numbers before journeying to the upper reaches of contemporary developments in number theory."--Jordan Ellenberg, author of How Not to Be Wrong: The Power of Mathematical Thinking"With joy and reflection,Summing It Upencourages readers to work alongside the authors to engage in simple computations with profound implications. It progresses elegantly to an insightful discussion of the ideas behind the classical theory of modular forms. A wonderful book."--Barry Mazur, Harvard University"This book takes general readers on a journey from simple addition to the modern theory of modular forms. Plentiful and accurate references are available for interested readers who want to look up further information."--Xiaoheng Wang, Princeton University"In Summing It Up, Ash and Gross are erudite and meticulous--they write with care and precision. Their book adopts the voice of a wise elder telling math stories to precocious children. It will interest readers of all ages who seek a window into current mathematics."--Kenneth Ribet, University of California, Berkeley"Summing It Up ambitiously presents concepts of number theory, from the elementary to the advanced, for readers with only a knowledge of high school math and some calculus. With a crisp yet conversational style and excellent examples, Ash and Gross explain a

great amount of interesting and important math."--James Pommersheim, coauthor of Number Theory: A Lively Introduction with Proofs, Applications, and Stories"A well-motivated and fun introduction to some very deep topics in mathematics, Summing It Up takes readers on a mathematics tour starting with very classical material and building towards some amazing recent work, with many highlights along the way. It can be read by those with many different levels of mathematical background. I thoroughly enjoyed it."--Nathan Kaplan, University of California, Irvine

This is an excellent book. It is really worth reading it. It contains very good material on Number Theory starting from basic notions till modular forms and elliptic curves. Some mathematical background is necessary to follow the proofs, which are presented mostly in full details and in a very transparent way. Every mathematician interested in this subject should read it. It is a shortcut to understand the difficulties of some classic problems in number theory. Summarizing, this is a serious maths book written by professionals in the area in a very friendly way, and, most important, there is no bs here.

I have the earlier two books by Ash and Gross. I particularly like "Elliptic Tales," and so was anticipating this introduction to modular forms. But this book doesn’t quite work.The book is divided into three parts -- 1) finite sums, 2) infinite sums, and 3) modular forms. The recurring theme that binds together the three parts is expressing numbers as sums of squares and of calculating the number of ways this can be done. In this connection, Bernoulli numbers (and functions) allow the authors to segue from the first part to the second. The discussion of Bernoulli numbers, the Riemann zeta-function, and generating functions is woefully brief -- considering the conceptual leap required from the first part to the second and considering that the target readership is assumed to have no background in complex analysis. But this is a minor quibble.The third part attempts to introduce modular forms and in this connection discusses SL2(Z), fundamental domains, q-expansions, dimensions of vector spaces of modular forms, Hecke operators, and L-functions. The chapter on applications includes some desultory discussion of partitions that doesn’t lead anywhere and a worked example for the number of ways 6 can be expressed as a sum of squares -- yet which doesn’t really employ the topics mentioned above. It seems to be a mix of weak heuristic explanation coupled with one solitary example. If the target reader is a scientific layman, I doubt he’ll be able to follow the discussion. If a math undergrad, the discussion won’t be ample enough, nor will it be precise and structured enough.To be fair, the math is difficult. My contention is that anyone trying to make this palatable to a lay readership will fail. The books I would propose for

coverage of modular forms would be:1) Modular Functions and Dirichlet Series in Number Theory, by Apostol,2) Elliptic Curves, Modular Forms, and their L-Functions, by Lozano-Robledo,3) Introduction to the Mathematics of Fermat-Wiles, by Hellegouarch,4) Introduction to Elliptic Curves and Modular Forms, by Koblitz, and5) A First Course in Modular Forms, by Diamond and Shurman.

Fantastic book for a panoramic view about number theory.

I admit that I didn't read the whole thing -- I'm a math PhD student. I skimmed the first two parts and read more carefully the third part of the book, which is about modular forms. I felt as though I was sitting in a college number theory lecture. The book is almost like a transcript of talks addressed to a lay audience with a serious interest in learning number theory. On the one hand, I appreciate the serious attitude the authors have -- not dumbing things down, so to speak. The first two parts are fine, but the last part is poorly written. It is by far the worst part of the book. The authors try to say too much in too little space. Perhaps some mathematicians know the feeling when they sit in a conference talk and the last thirty minutes are incomprehensible. That is what it felt like. The last part is only comprehensible to people who, more or less, already know the material. They did not get their point across in a clear, concise way. They could have written something like, "A modular form is a type of function studied by people working in a field of mathematics called complex analysis. The study of complex analysis reveals that modular forms have something called 'Fourier expansions,' something like a generalized polynomial. Typically, the coefficients of these expansions are not of much interest, but sometimes the coefficients come in patterns." Then they could have mentioned in a couple paragraphs the relationship between partition theory and modular forms, said that nowadays many number theorists regard modular forms as a basic part of their toolkit, and called it a day. Instead they mention without much explanation Riemann surfaces, sections of vector bundles, etc. They gave a formal definition of modular form that requires too much background to understand. My opinions regarding this book are more or less consistent with those in the much more comprehensive review by Mark Hunacek, which is available here: [...]

Great book and excellent service!

Good but not what I expected.

I liked this book more than other similar books I've tried. Reading it is like having someone explain

some math to you personally. No matter how much (or little) you know, there's probably something new in here for you to think about, unless perhaps if you're mentioned in this book's references or are a number theory researcher who would be entirely comfortable talking a piece of chalk in hand after some random person asked "Say, I'd like to know what a modular form is." In particular if you've seen the recent Ramanujan movie you might like this as a slow-starting but then ever-accelerating walkthrough of some of the number theory in it, maybe. By the intermediate value theorem, there's provably a moment at which you have to be learning something.

Summing It Up: From One Plus One to Modern Number Theory Number Tracing Book For Preschoolers: Number Tracing Book, Practice For Kids, Ages 3-5, Number Writing Practice Summing Up Summing Up: The Science of Reviewing Research Weight Watchers: Weight Watchers Cookbook-> Watchers Cookbook- Weight Watchers 2016 Weight Watchers Cookbook - Points Plus - Points Plus-Weight ... Points Plus, Weight Watchers 2016) (Volume 1) Using the TI-83 Plus/TI-84 Plus: Full Coverage of the TI-84 Plus Silver Edition Problems from the Discrete to the Continuous: Probability, Number Theory, Graph Theory, and Combinatorics (Universitext) Problems and Theorems in Analysis II: Theory of Functions. Zeros. Polynomials. Determinants. Number Theory. Geometry (Classics in Mathematics) Introduction to Non-Abelian Class Field Theory, An: Automorphic Forms of Weight 1 and 2-Dimensional Galois Representations (Series on Number Theory and Its Applications) The Sixteenth Round: From Number 1 Contender to Number 45472 What is my number?: a game of number clues for 3rd and 4th graders Contemporary's Number Power 4: Geometry: a real world approach to math (The Number Power Series) Aprender InglÃƒÂªs: N.o 3: Textos Paralelos, FÃƒÂ¡cil de ouvir, FÃƒÂ¡cil de ler : [Learn English: Number 3, Parallel Texts, Easy to Hear, Easy to Read]: Curso de ÃƒÂ•udio de InglÃƒÂªs, N.o 3 [English Audio Course, Number 3] Aprender AlemÃƒÂ£o, N.o 2: Textos Paralelos, FÃƒÂ¡cil de ouvir, FÃƒÂ¡cil de ler [Learn German, Number 2: Parallel Texts, Easy to Hear, Easy to Read]: Curso de ÃƒÂ•udio de AlemÃƒÂ£o, N.o 2 [German Audio Course, Number 2] Number Words and Number Symbols: A Cultural History of Numbers Number Talks: Whole Number Computation, Grades K-5: A Multimedia Professional Learning Resource Friendly Introduction to Number Theory, A (Classic Version) (4th Edition) (Pearson Modern Classics for Advanced Mathematics Series) Item Number:1582380783 Fifty State plus D.C. & Territories Commemorative Quarter Folder Modern Essentials Bundle 6th - Modern Essentials 6th Edition a Contemporary Guide to the Therapeutic Use of Essential Oils, An Introduction to Modern Essentials, and Modern Essentials Reference Card Cooking for One: 365 Recipes For One, Quick and Easy Recipes (Healthy Cooking for One, Easy Cooking for One, One

Pot, One Pan)