Review of the book

"Introduction to Number Theory"

by Martin Erickson and Anthony Vazzana
Chapman & Hall CRC, 2008

ISBN: 978-1-58488-937-3

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May 2011

1 Summary of the review

Introduction to Number Theory is a well-written book on this important branch of mathematics. The author organizes the work in a very structured way, dividing it into a first part about core topics that starts from the very basics, and a second and a third part regarding advanced topics, such as elliptic curves or Hilbert's tenth problem. The book is hence suitable for a wide range of readers, and the clear, almost story-like structure makes it easy to follow. As a plus, every chapter is correlated with interesting anecdotes about famous mathematicians from the past that gave important contributions to number theory, such as Euler, Gauss, or Euclid. Examples and calculations for two popular softwares like Mathematica and Maple are also provided, as well as an appendix describing how to use them. Strongly recommended to anyone interested in number theory.

2 Summary of the book

Number theory is one of the oldest branches of mathematics, its roots going back to the times of the legendary greek mathematicians such as Euclid or Erathostenes. The importance of this field of study has greatly increased in recent times due to applications, especially in cryptography, that are vital in the modern society.
The book aims to give a detailed introduction to this beautiful subject and to provide the reader a complete and solid understanding of it. It is divided into three main sections.

2.1 Part I

In Part I, the core topics are treated, starting from the very basics (natural numbers, principle of induction) and moving on to fundamental concepts like primes and divisibility (chapter 2), congruences (chapter 3) and quadratic residues (chapter 5). An exception is constituted by chapter 4, which is a brief overview of cryptography and its connection with number theory (ciphers, primes factorisation and the RSA cryptosystem). All of these chapter constitute the foundation and have to be considered as prerequisites for the following chapters.

2.2 Part II

Part II is about further topics in number theory. This includes arithmetic functions (chapter 6), a study of large primes (chapter 7), continued fractions (chapter 8) and diophantine equations (chapter 9).
All of these topics require a greater mathematical maturity and a certain confidence with proofs and notation. Despite the name "further topics", this is still to be considered an essential part of number theory.

2.3 Part III

Part III covers advanced topics and offers a spotlight on important and actual mathematical problems such as the very famous Fermat's Last Theorem (presented in chapter 11) and Hilbert's Tenth Problem (described in chapter 12). The rest of the chapters introduce ideas from analytic number theory (chapter 10) such as the well-known Riemann Zeta Function, an introduction to the theory of elliptic curves, and connections with logic. Knowledge of fundamentals of analysis and algebra is strongly recommended, as well as a cryptographic background (like the one given in chapter 4) for the part about elliptic curves.

2.4 Appendices

Finally, in the end of the book four appendices are provided, respectively about Mathematica basics, Maple basics, Web resources and notation, and the first two are especially useful if the reader has never approached these softwares before.

3 Style of the book

The text is written in a clear and reader-friendly style, and the topics are described carefully and naturally, almost like a story. That makes it easy to follow and very enjoyable.
Throughout the book a wide range of applications to "real-world" problems is presented, relatively to each topic, such as the case of RSA and the ISBN system. Many exercises and worked examples are provided, using both Mathematica and Maple packages. As a plus, almost every chapter is correlated with interesting anecdotes about the great mathematicians of the past that gave a contribution to number theory, from the already cited Euclid and Erathostenes to Euler, Fermat, and Gauss.

4 Would you recommend the book?

The author succeeds in presenting the topics of number theory in a very easy and natural way, and the presence of interesting anecdotes, applications, and recent problems alongside the obvious mathematical rigor makes the book even more appealing. I would certainly recommend it to a vast audience, and it is to be considered a valid and flexible textbook for any undergraduate number theory course.

The reviewer is a PhD student at University of Auckland, New Zealand.

An Introduction to the Theory of Numbers is a classic textbook in the field of number theory, by G. H. Hardy and E. M. Wright. The book grew out of a series of lectures by Hardy and Wright and was first published in 1938. The third edition added an elementary proof of the prime number theorem, and the sixth edition added a chapter on elliptic curves. List of important publications in mathematics. Accordingly, our task was to provide a series of introductory essays to various chapters of number theory, lead-ing the reader from illuminating examples of number theoretic objects and problems, through general notions and theories, developed gradually by many researchers, to some of the highlights of modern mathematics and great, some-times nebulous designs for future generations.Â 503. Introduction. Among the various branches of mathematics, number theory is characterized to a lesser degree by its primary subject (â€œintegersâ€) than by a psychologi-cal attitude. sided theory, but is an introduction, or a series of introductions, to. almost a11 of these sides in turn. We say something about each of a. number of subjects which are not usually combined in a single volume, and about some which are not always regarded as forming part of the. theory of numbers at all. Thus Chs. XII-XV belong to the â€˜algebraicâ€™. theory of numbers, Chs. XIX-XXI. to the â€˜additiveâ€™, and Ch. XXII. to the â€˜analyticâ€™ theories; while Chs. III, XI, XXIII, and XXIV deal. with matters usually classified under the headings of â€˜geometry of. Introduction to Number Theory. So, the notation. xy.Â Introduction to Number Theory. If we just want to nd any two divisors, there may be many ways to do so. Weâ€™d like to be able to nd a list of divisors in such a way that the same list is always found. Instead of looking for any divisors, letâ€™s agree to nd all prime divisors of a number. Introduction to Number Theory. Example: 120 = 12 Â· 10 = 3 Â· 4 Â· 2 Â· 5 = 3 Â· 2 Â· 2 Â· 2 Â· 5. Or, 120 = 2 Â· 60 = 2 Â· 6 Â· 10 = 2 Â· 2 Â· 3 Â· 2 Â· 5. We get the same prime factors, even though we didnâ€™t start with the same initial pair of divisors. Introduction to Number Theory. In fact, this will always be true !! Theo...

sided theory, but is an introduction, or a series of introductions, to. almost a11 of these sides in turn. We say something about each of a. number of subjects which are not usually combined in a single volume, and about some which are not always regarded as forming part of the. theory of numbers at all. Thus Chs. XII-XV belong to the â€˜algebraicâ€™. theory of numbers, Chs. XIX-XXI. to the â€˜additiveâ€™, and Ch. XXII. to the â€˜analyticâ€™ theories; while Chs. III, XI, XXIII, and XXIV deal. with matters usually classified under the headings of â€˜geometry of. An Introduction to Number Theory. Age 16 to 18. Article by Vicky Neale. Published 2005 Revised 2019. In this article we shall look at some elementary results in Number Theory, partly because they are interesting in themselves, partly because they are useful in other contexts (for example in olympiad problems), and partly because they will give you a flavour of what Number Theory is about.Â The Fundamental Theorem of Arithmetic: Every natural number $n> 1$ can be expressed in an essentially unique way as the product of prime numbers. By "essentially unique", I mean "counting different orderings of the primes as the same": $12=2^2\times3=3\times2^2$, but I'm counting these products as essentially the same. Introduction to Number Theory. By Mathew Crawford. A thorough introduction for students in grades 7-10 to topics in number theory such as primes & composites, multiples & divisors, prime factorization and its uses, base numbers, modular arithmetic, divisibility rules, linear congruences, how to develop number sense, and more. VIEW DETAILS. I liked this class because it taught me a lot of things that I didn't have the opportunity to learn in school. Introduction to number theory. 1 Primality Testing and RSA. The first stage of key-generation for RSA involves finding two large primes p, q. Because of the size of numbers used, must find primes by trial and error. Modern primality tests utilize properties of primes eg: an-1 = 1 mod n where GCD(a,n)=1. all primes numbers 'n' will satisfy this equation. some composite numbers will also satisfy the equation, and are called pseudo-primes. Most modern tests guess at a prime number 'n', then take a large number (eg 100) of numbers 'a', and apply this test to each. If it fails the number is composi On historical and mathematical grounds alike, number theory has earned a place in the curriculum of every mathematics student. This clear presentation covers the elements of number theory, with stress on the basic topics concerning prime numbers and Diophantine equations (especially quadratic equations in two variables). Topics covered include distribution of primes, unique factorization, reduction of positive definite quadratic forms, the Kronecker symbol, continued fractions, and what Gauss did.

An Introduction to Number Theory. Age 16 to 18. Article by Vicky Neale. Published 2005 Revised 2019. In this article we shall look at some elementary results in Number Theory, partly because they are interesting in themselves, partly because they are useful in other contexts (for example in olympiad problems), and partly because they will give you a flavour of what Number Theory is about.Â The Fundamental Theorem of Arithmetic: Every natural number $n> 1$ can be expressed in an essentially unique way as the product of prime numbers. By "essentially unique", I mean "counting different orderings of the primes as the same": $12=2^2\times3=3\times2^2$, but I'm counting these products as essentially the same. Number theory in cryptography. The mean value of number-theoretic functions. Approximation of irrational numbers. Pell's equation. Number theory of polynomials. Algebraic and transcendental numbers. Quadratic forms.Â These lecture notes are written to provide a text to my Introduction to Number Theory course at Budapest Semesters in Mathematics. v. Chapter 1 The structure of integers. 1.1 Introduction. We do not aim to build up arithmetic from axioms: we suppose that the set N of positive integers, the set Z of integers, the set Q of rationals, the set R of reals and the set C of complex numbers exist and the basic operations (addition, subtraction, multiplication, division and raising a positive number to powers) are performed as usual. Home General Math Topics Number Theory Introduction to Number Theory: The Basic Concepts. Introduction to Number Theory: The Basic Concepts. Posted on May 17, 2021 Written by The Cthaeh Leave a Comment. Hi, everyone. Today I want to talk about number theory, one of the most important and fundamental fields in all of mathematics.Â In this final section, I want to introduce two other important concepts from number theory that connect everything we did so far. I want to talk about the sets of common factors and common multiples between two or more numbers, as well two privileged members of those sets: the greatest common factor (GCF) and the least common multiple (LCM). â€˜. . . the well-known and charming introduction to number theory . . . can be recommended both for independent study and as a reference text for a general mathematical audience.â€™ European Maths Society Journal. â€˜Although this book is not written as a textbook but rather as a work for the general reader, it could certainly be used as a. textbook for an undergraduate course in number theory and, in the reviewerâ€™s opinion, is far superior for this purpose to any. other book in English.â€™ Bulletin of the American Mathematical Society. The higher. Arithmetic. An introduction to the theory of numbers... Introduction to number theory. 1 Primality Testing and RSA. The first stage of key-generation for RSA involves finding two large primes p, q. Because of the size of numbers used, must find primes by trial and error. Modern primality tests utilize properties of primes eg: an-1 = 1 mod n where GCD(a,n)=1. all primes numbers 'n' will satisfy this equation. some composite numbers will also satisfy the equation, and are called pseudo-primes. Most modern tests guess at a prime number 'n', then take a large number (eg 100) of numbers 'a', and apply this test to each. If it fails the number is composite, otherwise it is is probably prime. There are a number of stronger tests which will accept fewer composites as prime than the above test. eg: RSA Implementation in Practice.