Elementary Number Theory

& ITS APPLICATIONS 7th

$$\sum_{d|n} \phi(d) = n$$

$$\phi(p^a) = p^a - p^{a-1}$$

$$f(n) = \sum_{d|n} \mu(d) F(n/d)$$

$f_1 = 1, \; f_2 = 1, \; f_n = f_{n-1} + f_{n-2} \text{ for } n \geq 3$

$ma + nb = (a, b)$

$T(n) = \begin{cases} n/2 & \text{if } n \text{ is even;} \\ (3n+1)/2 & \text{if } n \text{ is odd.} \end{cases}$

$y^2 = x^3 + ax + b$

$P_1 + P_2 = (m^2 - x_1 - x_2, m(x_1 - x_3) - y_1)$

$P + \infty = P$

$\left(\dfrac{p}{q}\right)\left(\dfrac{q}{p}\right) = (-1)^{\frac{p-1}{2} \cdot \frac{q-1}{2}}$

$E(P) = C \equiv P^e \pmod{n}, \quad 0 \leq C < n$

$S \equiv D_{Alice}(M) \equiv M^{d_{Alice}} \pmod{n_{Alice}}$

$\sqrt{d^2 + 1} = [d; \overline{2d}]$

$$\prod_{i=1}^{\infty}(1 - x^i) = \sum_{n=-\infty}^{\infty}(-1)^n x^{n(3n-1)/2} = 1 + \sum_{n=1}^{\infty}(-1)^n x^{n(3n-1)/2}(1 + x^n)$$

$x \equiv 3C + \lfloor C/4 \rfloor + \lfloor Y/4 \rfloor - 3 \pmod 7$

$p(200) = 3,972,999,029,388$

$$\sum c_i x_i \equiv 0 \pmod{11}$$

$p(11k + 6) \equiv 0 \pmod{11}$

$x \equiv a_1 M_1 y_1 + a_2 M_2 y_2 + \cdots + a_r M_r y_r$

$\max\{|a|, |b|, |c|\} < K(\epsilon)(\mathrm{rad}(abc))^{1+\epsilon}$

$Q_n = p_1 p_2 \cdots p_n + 1$

$x^2 - dy^2 = 1$

$\phi(n) = n\left(1 - \dfrac{1}{p_1}\right)\left(1 - \dfrac{1}{p_2}\right) \cdots \left(1 - \dfrac{1}{p_k}\right)$

$2^{82,589,933} - 1$

$x^n + y^n = z^n$

$p_n \sim n \log n$

$a^{\phi(m)} \equiv 1 \pmod m$

$x^n - y^n = z^n$

$F_n = 2^{2^n} + 1$

$a^{p-1} \equiv 1 \pmod p$

$x^3 + y^3 = z^3$

$(p-1)! \equiv -1 \pmod p$

Kenneth H. Rosen

Selected Topics In Elementary Number Theory

Heinz-Otto Peitgen,Hartmut Jürgens,Dietmar Saupe

Selected Topics In Elementary Number Theory:

Problem-Solving and Selected Topics in Number Theory Michael Th. Rassias,2010-12-02 The book provides a self contained introduction to classical Number Theory All the proofs of the individual theorems and the solutions of the exercises are being presented step by step Some historical remarks are also presented The book will be directed to advanced undergraduate beginning graduate students as well as to students who prepare for mathematical competitions ex Mathematical Olympiads and Putnam Mathematical competition **Selected Topics in Number Theory** Hansraj Gupta,1980 **Hiding Data - Selected Topics** Rudolf Ahlswede,2016-04-18 Devoted to information security this volume begins with a short course on cryptography mainly based on lectures given by Rudolf Ahlswede at the University of Bielefeld in the mid 1990s It was the second of his cycle of lectures on information theory which opened with an introductory course on basic coding theorems as covered in Volume 1 of this series In this third volume Shannon s historical work on secrecy systems is detailed followed by an introduction to an information theoretic model of wiretap channels and such important concepts as homophonic coding and authentication Once the theoretical arguments have been presented comprehensive technical details of AES are given Furthermore a short introduction to the history of public key cryptology RSA and El Gamal cryptosystems is provided followed by a look at the basic theory of elliptic curves and algorithms for efficient addition in elliptic curves Lastly the important topic of oblivious transfer is discussed which is strongly connected to the privacy problem in communication Today the importance of this problem is rapidly increasing and further research and practical realizations are greatly anticipated This is the third of several volumes serving as the collected documentation of Rudolf Ahlswede s lectures on information theory Each volume includes comments from an invited well known expert In the supplement to the present volume R diger Reischuk contributes his insights Classical information processing concerns the main tasks of gaining knowledge and the storage transmission and hiding of data The first task is the prime goal of Statistics For transmission and hiding data Shannon developed an impressive mathematical theory called Information Theory which he based on probabilistic models The theory largely involves the concept of codes with small error probabilities in spite of noise in the transmission which is modeled by channels The lectures presented in this work are suitable for graduate students in Mathematics and also for those working in Theoretical Computer Science Physics and Electrical Engineering with a background in basic Mathematics The lectures can be used as the basis for courses or to supplement courses in many ways Ph D students will also find research problems often with conjectures that offer potential subjects for a thesis More advanced researchers may find questions which form the basis of entire research programs *Number Theory with Computations* Peter Shiu,2024-09-02 This introductory text is designed for undergraduate courses in number theory covering both elementary number theory and analytic number theory The book emphasises computational aspects including algorithms and their implementation in Python The book is divided into two parts The first part on elementary number theory deals with

concepts such as induction divisibility congruences primitive roots cryptography and continued fractions The second part is devoted to analytic number theory and includes chapters on Dirichlet s theorem on primes in arithmetic progressions the prime number theorem smooth numbers and the famous circle method of Hardy and Littlewood The book contains many topics not often found in introductory textbooks such as Aubry s theorem the Tonelli Shanks algorithm factorisation methods continued fraction representations of e and the irrationality of 3 Each chapter concludes with a summary and notes as well as numerous exercises Assuming only basic calculus for the first part of the book the second part assumes some knowledge of complex analysis Familiarity with basic coding syntax will be helpful for the computational exercises **Elementary Number Theory** James S. Kraft,Lawrence C. Washington,2014-11-24 Elementary Number Theory takes an accessible approach to teaching students about the role of number theory in pure mathematics and its important applications to cryptography and other areas The first chapter of the book explains how to do proofs and includes a brief discussion of lemmas propositions theorems and corollaries The core of the tex **Undergraduate Catalog** University of Michigan--Dearborn,2006 **Undergraduate Announcement** University of Michigan--Dearborn,1983 A Course in Number Theory and Cryptography Neal Koblitz,2012-12-06 The purpose of this book is to introduce the reader to arithmetic topics both ancient and modern that have been at the center of interest in applications of number theory particularly in cryptography Because number theory and cryptography are fast moving fields this new edition contains substantial revisions and updated references *Chaos and Fractals* Heinz-Otto Peitgen,Hartmut Jürgens,Dietmar Saupe,2013-06-29 For almost 15 years chaos and fractals have been riding a wave that has enveloped many areas of mathematics and the natural sciences in its power creativity and expanse Traveling far beyond the traditional bounds of mathematics and science to the distant shores of popular culture this wave captures the attention and enthusiasm of a worldwide audience The fourteen chapters of this book cover the central ideas and concepts of chaos and fractals as well as many related topics including the Mandelbrot Set Julia Sets Cellulair Automata L systems Percolation and Strange Attractors Each chapter is closed by a Program of the Chapter which provides computer code for a central experiment Two appendices complement the book The first by Yuval Fisher discusses the details and ideas of fractal images and compression the second by Carl J G Evertsz and Benoit Mandelbrot introduces the foundations and implications of multifractals Handbook of Functional Equations Themistocles M. Rassias,2014-11-18 As Richard Bellman has so elegantly stated at the Second International Conference on General Inequalities Oberwolfach 1978 There are three reasons for the study of inequalities practical theoretical and aesthetic On the aesthetic aspects he said As has been pointed out beauty is in the eye of the beholder However it is generally agreed that certain pieces of music art or mathematics are beautiful There is an elegance to inequalities that makes them very attractive The content of the Handbook focuses mainly on both old and recent developments on approximate homomorphisms on a relation between the Hardy Hilbert and the Gabriel inequality generalized Hardy Hilbert type inequalities on multiple

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