Édouard Lucas and Primality Testing

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Hugh C. Williams

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Evangelos Kranakis,Gonzalo Navarro,Edgar Chávez

Edouard Lucas And Primality Testing:

Edouard Lucas and Primality Testing Hugh C. Williams,1998-03-31 Describes the development and extension of fundamental idea of Edouard Lucas a French mathematician and mathematical recreationist that is still used today in the verification of the largest primes **Édouard Lucas and Primality Testing** Hugh C. Williams,2021 **Factorization and Primality Testing** David M. Bressoud,2012-12-06 About binomial theorems I m teeming with a lot of news With many cheerful facts about the square on the hypotenuse William S Gilbert The Pirates of Penzance Act I The question of divisibility is arguably the oldest problem in mathematics Ancient peoples observed the cycles of nature the day the lunar month and the year and assumed that each divided evenly into the next Civilizations as separate as the Egyptians of ten thousand years ago and the Central American Mayans adopted a month of thirty days and a year of twelve months Even when the inaccuracy of a 360 day year became apparent they preferred to retain it and add five intercalary days The number 360 retains its psychological appeal today because it is divisible by many small integers The technical term for such a number reflects this appeal It is called a smooth number At the other extreme are those integers with no smaller divisors other than 1 integers which might be called the indivisibles The mystic qualities of numbers such as 7 and 13 derive in no small part from the fact that they are indivisibles The ancient Greeks realized that every integer could be written uniquely as a product of indivisibles larger than 1 what we appropriately call prime numbers To know the decomposition of an integer into a product of primes is to have a complete description of all of its divisors *Primality Testing and Integer Factorization in Public-Key Cryptography* Song Y. Yan,2009-04-03 Intended for advanced level students in computer science and mathematics this key text now in a brand new edition provides a survey of recent progress in primality testing and integer factorization with implications for factoring based public key cryptography For this updated and revised edition notable new features include a comparison of the Rabin Miller probabilistic test in RP the Atkin Morain elliptic curve test in ZPP and the AKS deterministic test High Primes and Misdemeanours: Lectures in Honour of the 60th Birthday of Hugh Cowie Williams A. J. Van Der Poorten,Andreas Stein,2004 This volume consists of a selection of papers based on presentations made at the international conference on number theory held in honor of Hugh Williams sixtieth birthday The papers address topics in the areas of computational and explicit number theory and its applications The material is suitable for graduate students and researchers interested in number theory **Number Theory Through Inquiry** David C. Marshall,Edward Odell,Michael Starbird,2020-08-21 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 **APPLIED CRYPTOGRAPHY** SINGH, KHUMANTHEM MANGLEM,2025-02-01 Cryptography is often perceived as a highly mathematical subject making it challenging for many learners to grasp Recognizing this the book has been written with a focus on accessibility requiring minimal prerequisites in number theory or algebra The book aims to explain cryptographic principles and how to apply and develop cryptographic algorithms and systems The book comprehensively covers symmetric and asymmetric ciphers hashes digital signatures random number generators authentication schemes secret sharing schemes key distribution elliptic curves and their practical applications To simplify the subject the book begins with an introduction to the essential concepts of number theory tailored for students with little to no prior exposure The content is presented with an algorithmic approach and includes numerous illustrative examples making it ideal for beginners as well as those seeking a refresher Overall the book serves as a practical and approachable guide to mastering the subject KEY FEATURE Includes recent applications of elliptic curves with extensive algorithms and corresponding examples and exercises with detailed solutions Primality testing algorithms such as Miller Rabin Solovay Strassen and Lucas Lehmer for Mersenne integers are described for selecting strong primes Factoring algorithms such as Pollard r 1 Pollard Rho Dixon s Quadratic sieve Elliptic curve factoring algorithms are discussed Paillier cryptosystem and Paillier publicly verifiable secret sharing scheme are described Signcryption scheme that provides both confidentiality and authentication is explained for traditional and elliptic curve based approaches TARGET AUDIENCE B Tech Computer Science and Engineering B Tech Electronics and Communication Engineering *Number Theory for the Millennium III* M.A. Bennett,Bruce Berndt,N. Boston,A.J. Hildebrand,H.G. Diamond,W. Philipp,2023-03-17 Building on the tradition of an outstanding series of conferences at the University of Illinois at Urbana Champaign the organizers attracted an international group of scholars to open the new Millennium with a conference that reviewed the current state of number

theory research and pointed to future directions in the field The conference was the largest general number theory conference in recent history featuring a total of 159 talks with the plenary lectures given by George Andrews Jean Bourgain Kevin Ford Ron Graham Andrew Granville Roger Heath Brown Christopher Hooley Winnie Li Kumar Murty Mel Nathanson Ken Ono Carl Pomerance Bjorn Poonen Wolfgang Schmidt Chris Skinner K Soundararajan Robert Tijdeman Robert Vaughan and Hugh Williams The Proceedings Volumes of the conference review some of the major number theory achievements of this century and to chart some of the directions in which the subject will be heading during the new century These volumes will serve as a useful reference to researchers in the area and an introduction to topics of current interest in number theory for a general audience in mathematics **Number Theory for Computing** Song Y. Yan,2013-03-09 Mathematicians do not study objects but relations among objectsj they are indifferent to the replacement of objects by others as long as relations do not change Matter is not important only form interests them HENRI POINCARE 1854 1912 Computer scientists working on algorithms for factorization would be well advised to brush up on their number theory IAN STEWART 219 The theory of numbers in mathematics is primarily the theory of the prop erties of integers i e the whole numbers particularly the positive integers For example Euclid proved 2000 years aga in his Elements that there exist infinitely many prime numbers The subject has long been considered as the purest branch of mathematics with very few applications to other areas How ever recent years have seen considerable increase in interest in several central topics of number theory precisely because of their importance and applica tions in other areas particularly in computing and information technology *High Primes and Misdemeanours* Hugh C. Williams,A. J. Van Der Poorten,Andreas Stein, This volume consists of a selection of papers based on presentations made at the international conference on number theory held in honor of Hugh Williams sixtieth birthday The papers address topics in the areas of computational and explicit number theory and its applications The material is suitable for graduate students and researchers interested in number theory **LATIN 2016: Theoretical Informatics** Evangelos Kranakis,Gonzalo Navarro,Edgar Chávez,2016-03-21 This book constitutes the refereed proceedings of the 12th Latin American Symposium on Theoretical Informatics LATIN 2016 held in Ensenada Mexico in April 2016 The 52 papers presented together with 5 abstracts were carefully reviewed and selected from 131 submissions The papers address a variety of topics in theoretical computer science with a certain focus on algorithms approximation online randomized algorithmic game theory etc analytic combinatorics and analysis of algorithms automata theory and formal languages coding theory and data compression combinatorial algorithms combinatorial optimization combinatorics and graph theory complexity theory computational algebra computational biology computational geometry computational number theory cryptology databases and information retrieval data structures formal methods and security Internet and the web parallel and distributed computing pattern matching programming language theory and random structures The Joy of Factoring Samuel S. Wagstaff (Jr.),2013-10-24 This book is about the theory and practice of integer factorization presented in a historic

perspective It describes about twenty algorithms for factoring and a dozen other number theory algorithms that support the factoring algorithms Most algorithms are described both in words and in pseudocode to satisfy both number theorists and computer scientists Each of the ten chapters begins with a concise summary of its contents This book is written for readers who want to learn more about the best methods of factoring integers many reasons for factoring and some history of this fascinating subject It can be read by anyone who has taken a first course in number theory Publisher website

Computational Number Theory and Modern Cryptography Song Y. Yan,2013-01-29 The only book to provide a unified view of the interplay between computational number theory and cryptography Computational number theory and modern cryptography are two of the most important and fundamental research fields in information security In this book Song Y Yang combines knowledge of these two critical fields providing a unified view of the relationships between computational number theory and cryptography The author takes an innovative approach presenting mathematical ideas first thereupon treating cryptography as an immediate application of the mathematical concepts The book also presents topics from number theory which are relevant for applications in public key cryptography as well as modern topics such as coding and lattice based cryptography for post quantum cryptography The author further covers the current research and applications for common cryptographic algorithms describing the mathematical problems behind these applications in a manner accessible to computer scientists and engineers Makes mathematical problems accessible to computer scientists and engineers by showing their immediate application Presents topics from number theory relevant for public key cryptography applications Covers modern topics such as coding and lattice based cryptography for post quantum cryptography Starts with the basics then goes into applications and areas of active research Geared at a global audience classroom tested in North America Europe and Asia Incudes exercises in every chapter Instructor resources available on the book s Companion Website Computational Number Theory and Modern Cryptography is ideal for graduate and advanced undergraduate students in computer science communications engineering cryptography and mathematics Computer scientists practicing cryptographers and other professionals involved in various security schemes will also find this book to be a helpful reference **The Enchantment of Numbers** Eric L. F. Roettger,Hugh C. Williams,2025-07-01 Inspired by the classic Recreations in the Theory of Numbers The Queen of Mathematics Entertains by Albert H Beiler this book brings the excitement of recreational number theory into the 21st century through the lens of computational techniques While Beiler s work originally published in 1964 captivated readers with its breadth and charm some sections have become dated Here we re examine most of the key topics Beiler covered while introducing fresh updates and insights rooted in computational number theory The authors aim to present efficient computer algorithms to tackle various problems that arise in the theory of numbers providing a deeper and more modern perspective on these timeless puzzles Though we cannot rival Beiler s exuberant prose we hope our enduring fascination with these topics cultivated over decades of study and teaching will shine through and resonate with readers The

book is structured into 21 chapters each focusing on different facets of number theory with which the authors have extensive expertise From ancient problems to contemporary computational challenges this volume will reignite the joy and wonder found in numbers while incorporating the power of modern computation Whether you re a seasoned mathematician or a curious learner this book promises a journey through the rich and playful landscape of number theory making both historical and new discoveries accessible to all **Public-Key Cryptography and Computational Number Theory** Kazimierz Alster,Jerzy Urbanowicz,Hugh C. Williams,2011-06-24 The Proceedings contain twenty selected refereed contributions arising from the International Conference on Public Key Cryptography and Computational Number Theory held in Warsaw Poland on September 11 15 2000 The conference attended by eightyfive mathematicians from eleven countries was organized by the Stefan Banach International Mathematical Center This volume contains articles from leading experts in the world on cryptography and computational number theory providing an account of the state of research in a wide variety of topics related to the conference theme It is dedicated to the memory of the Polish mathematicians Marian Rejewski 1905 1980 Jerzy R ycki 1909 1942 and Henryk Zygalski 1907 1978 who deciphered the military version of the famous Enigma in December 1932 January 1933 A noteworthy feature of the volume is a foreword written by Andrew Odlyzko on the progress in cryptography from Enigma time until now Those Fascinating Numbers Jean-Marie De Koninck,2009 Who would have thought that listing the positive integers along with their most remarkable properties could end up being such an engaging and stimulating adventure The author uses this approach to explore elementary and advanced topics in classical number theory A large variety of numbers are contemplated Fermat numbers Mersenne primes powerful numbers sublime numbers Wieferich primes insolite numbers Sastry numbers voracious numbers to name only a few The author also presents short proofs of miscellaneous results and constantly challenges the reader with a variety of old and new number theory conjectures This book becomes a platform for exploring new concepts such as the index of composition and the index of isolation of an integer In addition the book displays several tables of particular families of numbers including the list of all 88 narcissistic numbers and the list of the eight known numbers which are not prime powers but which can be written as the sum of the cubes of their prime factors and in each case with the algorithm used to create them **Combinatorial Number Theory** Bruce Landman,Melvyn B. Nathanson,Jaroslav Nesetril,Richard J. Nowakowski,Carl Pomerance,2011-12-22 This carefully edited volume contains selected refereed papers based on lectures presented by many distinguished speakers at the Integers Conference 2005 an international conference in combinatorial number theory The conference was held in celebration of the 70th birthday of Ronald Graham a leader in several fields of mathematics Fibonacci and Lucas Numbers with Applications Thomas Koshy,2011-10-24 The first comprehensive survey of mathematics most fascinatingnumber sequences Fibonacci and Lucas numbers have intrigued amateur and professionalmathematicians for centuries This volume represents the firstattempt to compile a definitive history and authoritative analysisof these famous integer sequences complete with a

wealth ofexciting applications enlightening examples and fun exercisesthat offer numerous opportunities for exploration andexperimentation The author has assembled a myriad of fascinating properties of bothFibonacci and Lucas numbers as developed by a wide range ofsources and catalogued their applications in a multitude of widelyvaried disciplines such as art stock market investing engineering and neurophysiology Most of the engaging anddelightful material here is easily accessible to college and evenhigh school students though advanced material is included tochallenge more sophisticated Fibonacci enthusiasts A historicalsurvey of the development of Fibonacci and Lucas numbers biographical sketches of intriguing personalities involved indeveloping the subject and illustrative examples round out thisthorough and amusing survey Most chapters conclude with numericand theoretical exercises that do not rely on long and tediousproofs of theorems Highlights include Balanced blend of theory and real world applications Excellent reference material for student reports andprojects User friendly informal and entertaining writing style Historical interjections and short biographies that add a richerperspective to the topic Reference sections providing important symbols problemsolutions and fundamental properties from the theory of numbersand matrices Fibonacci and Lucas Numbers with Applications providesmathematicians with a wealth of reference material in oneconvenient volume and presents an in depth and entertainingresource for enthusiasts at every level and from any background   **Recurrence Sequences** Graham Everest, Alf van der Poorten,Igor Shparlinski,Thomas Ward,2015-09-03 Recurrence sequences are of great intrinsic interest and have been a central part of number theory for many years Moreover these sequences appear almost everywhere in mathematics and computer science This book surveys the modern theory of linear recurrence sequences and their generalizations Particular emphasis is placed on the dramatic impact that sophisticated methods from Diophantine analysis and transcendence theory have had on the subject Related work on bilinear recurrences and an emerging connection between recurrences and graph theory are covered Applications and links to other areas of mathematics are described including combinatorics dynamical systems and cryptography and computer science The book is suitable for researchers interested in number theory combinatorics and graph theory   Integers Bruce Landman,2014-06-18 Integers is a refereed online journal devoted to research in the area of combinatorial number theory It publishes original research articles in combinatorics and number theory Topics covered by the journal include additive number theory multiplicative number theory sequences and sets extremal combinatorics Ramsey theory elementary number theory classical combinatorial problems hypergraphs and probabilistic number theory Integers also houses a combinatorial games section This work presents all papers of the 2013 volume in book form

Edouard Lucas And Primality Testing Book Review: Unveiling the Magic of Language

In a digital era where connections and knowledge reign supreme, the enchanting power of language has are more apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is actually remarkable. This extraordinary book, aptly titled "**Edouard Lucas And Primality Testing**," compiled by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect our existence. Throughout this critique, we will delve into the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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