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17 Lectures on Fermat Numbers

From Number Theory
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17 Lectures On Fermat Numbers

Xiao-Qiang Zhao



17 Lectures On Fermat Numbers:

17 Lectures on Fermat Numbers Michal Krizek, Florian Luca, Lawrence Somer, 2002-01-08 The pioneering work of Pierre de Fermat has attracted the attention of mathematicians for over 350 years This book provides an overview of the many properties of Fermat numbers and demonstrates their applications in areas such as number theory probability theory geometry and signal processing It is an ideal introduction to the basic mathematical ideas and algebraic methods connected with the Fermat numbers

17 Lectures on Fermat Numbers Michal Krizek, Florian Luca, Lawrence Somer, 2013-03-14 French mathematician Pierre de Fermat became most well known for his pioneering work in the area of number theory His work with numbers has been attracting the attention of amateur and professional mathematicians for over 350 years This book was written in honor of the 400th anniversary of his birth and is based on a series of lectures given by the authors The purpose of this book is to provide readers with an overview of the many properties of Fermat numbers and to demonstrate their numerous appearances and applications in areas such as number theory probability theory geometry and signal processing This book introduces a general mathematical audience to basic mathematical ideas and algebraic methods connected with the Fermat numbers and will provide invaluable reading for the amateur and professional alike

Recent Advances in Algorithms and Combinatorics Bruce A. Reed, Claudia L. Linhares-Sales, 2006-05-17 Combinatorics is one of the fastest growing elds of mathematics In large measure this is because many practical problems can be modeled and then efficiently solved using combinatorial theory This real world motivation for studying algorithmic combinatorics has led not only to the development of many software packages but also to some beautiful mathematics which has no direct application to applied problems In this volume we highlight some exciting recent developments in algorithmic combinatorics Most practical applications of algorithmic combinatorics would be possible without the use of the computer As computers become ever more powerful more and more applications become possible Computational biology is one example of a relatively new eld in which algorithmic combinatorics plays a key role The chapter by Sagot and Wakabayashi in this volume discusses how combinatorial tools can be used to search for patterns in DNA and protein sequences The information technology revolution has not only allowed for the solution of practical problems using combinatorial techniques it has also been the source of many new combinatorial problems One example is radio channel assignment In this problem we have a number of transmitters each of which must handle a number of calls Each call must be assigned a frequency in such a way that interference is avoided thus calls handled by the same transmitter are assigned different frequencies as are calls handled by transmitters which are near each other The explosive growth in the use of the frequency spectrum due to e.g. mobile telephone networks has made it a very valuable resource

Counting and Configurations Jiri Herman, Radan Kucera, Jaromir Simsa, 2013-03-14 This book can be seen as a continuation of *Equations and Inequalities Elementary Problems and Theorems in Algebra and Number Theory* by the same authors and published as the first volume in this book series However it can be

independently read or used as a textbook in its own right This book is intended as a text for a problem solving course at the first or second year university level as a text for enrichment classes for talented high school students or for mathematics competition training It can also be used as a source of supplementary material for any course dealing with combinatorics graph theory number theory or geometry or for any of the discrete mathematics courses that are offered at most American and Canadian universities The underlying philosophy of this book is the same as that of Equations and Inequalities The following paragraphs are therefore taken from the preface of that book

Dynamical Systems in Population Biology

Xiao-Qiang Zhao,2013-06-05 Population dynamics is an important subject in mathematical biology A central problem is to study the long term behavior of modeling systems Most of these systems are governed by various evolutionary equations such as difference ordinary functional and partial differential equations see e g 165 142 218 119 55 As we know interactive populations often live in a fluctuating environment For example physical environmental conditions such as temperature and humidity and the availability of food water and other resources usually vary in time with seasonal or daily variations Therefore more realistic models should be nonautonomous systems In particular if the data in a model are periodic functions of time with commensurate period a periodic system arises if these periodic functions have different minimal periods we get an almost periodic system The existing reference books from the dynamical systems point of view mainly focus on autonomous biological systems The book of Hess 106J is an excellent reference for periodic parabolic boundary value problems with applications to population dynamics Since the publication of this book there have been extensive investigations on periodic asymptotically periodic almost periodic and even general nonautonomous biological systems which in turn have motivated further development of the theory of dynamical systems In order to explain the dynamical systems approach to periodic population problems let us consider as an illustration two species periodic competitive systems $\frac{dU}{dt} = U(1 - U - \alpha V)$ $\frac{dV}{dt} = V(1 - V - \beta U)$

Interpolation and Approximation by Polynomials

George M. Phillips,2006-04-06 This book is intended as a course in numerical analysis and approximation theory for advanced undergraduate students or graduate students and as a reference work for those who lecture or research in this area Its title pays homage to Interpolation and Approximation by Philip J Davis published in 1963 by Blaisdell and reprinted by Dover in 1976 My book is less general than Philip Davis's much respected classic as the qualification by polynomials in its title suggests and it is pitched at a less advanced level I believe that no one book can fully cover all the material that could appear in a book entitled Interpolation and Approximation by Polynomials Nevertheless I have tried to cover most of the main topics I hope that my readers will share my enthusiasm for this exciting and fascinating area of mathematics and that by working through this book some will be encouraged to read more widely and pursue research in the subject Since my book is concerned with polynomials it is written in the language of classical analysis and the only prerequisites are introductory courses in analysis and linear algebra

Humankind and the Cosmos: Early

Christian Representations Doru Costache,2021-07-15 In this volume Costache endeavours to map the world as it was

understood and experienced by the early Christians Progressing from initial fears they came to adopt a more positive view of the world through successive shifts of perception This did not happen overnight Tracing these shifts Costache considers the world of the early Christians through an interdisciplinary lens revealing its meaningful complexity He demonstrates that the early Christian worldview developed at the nexus of several perspectives What facilitated this process was above all the experience of contemplating nature When accompanied by genuine personal transformation natural contemplation fostered the theological interpretation of the world as it had been known to the ancients

Mersenne Numbers And Fermat Numbers Elena Deza,2021-08-06 This book contains a complete detailed description of two classes of special numbers closely related to classical problems of the Theory of Primes There is also extensive discussions of applied issues related to Cryptography In Mathematics a Mersenne number named after Marin Mersenne who studied them in the early 17 th century is a number of the form $M_n = 2^n - 1$ for positive integer n In Mathematics a Fermat number named after Pierre de Fermat who first studied them is a positive integer of the form $F_n = 2^{2^n} + 1$ where n is a non negative integer Mersenne and Fermat numbers have many other interesting properties Long and rich history many arithmetic connections with perfect numbers with construction of regular polygons etc numerous modern applications long list of open problems allow us to provide a broad perspective of the Theory of these two classes of special numbers that can be useful and interesting for both professionals and the general audience

Convex Analysis and Nonlinear Optimization Jonathan Borwein,Adrian S. Lewis,2010-05-05 Optimization is a rich and thriving mathematical discipline The theory underlying current computational optimization techniques grows ever more sophisticated The powerful and elegant language of convex analysis unifies much of this theory The aim of this book is to provide a concise accessible account of convex analysis and its applications and extensions for a broad audience It can serve as a teaching text at roughly the level of first year graduate students While the main body of the text is self contained each section concludes with an often extensive set of optional exercises The new edition adds material on semismooth optimization as well as several new proofs that will make this book even more self contained

Gazette - Australian Mathematical Society Australian Mathematical Society,2004

Mathematical Analysis and Analytic Number Theory 2019 Rekha Srivastava,2021-04-06 This volume is a collection of investigations involving the theory and applications of the various tools and techniques of mathematical analysis and analytic number theory which are remarkably widespread in many diverse areas of the mathematical biological physical chemical engineering and statistical sciences It contains invited and welcome original as well as review cum expository research articles dealing with recent and new developments on the topics of mathematical analysis and analytic number theory as well as their multidisciplinary applications

From Great Discoveries in Number Theory to Applications Michal Křížek,Lawrence Somer,Alena Šolcová,2021-09-21 This book provides an overview of many interesting properties of natural numbers demonstrating their applications in areas such as cryptography geometry astronomy mechanics computer science and

recreational mathematics In particular it presents the main ideas of error detecting and error correcting codes digital signatures hashing functions generators of pseudorandom numbers and the RSA method based on large prime numbers A diverse array of topics is covered from the properties and applications of prime numbers some surprising connections between number theory and graph theory pseudoprimes Fibonacci and Lucas numbers and the construction of Magic and Latin squares to the mathematics behind Prague s astronomical clock Introducing a general mathematical audience to some of the basic ideas and algebraic methods connected with various types of natural numbers the book will provide invaluable reading for amateurs and professionals alike **Introduction to Experimental Mathematics** Søren Eilers,Rune Johansen (Mathematician),2017-06 This text introduces students to an experimental approach to mathematics using Maple to systematically investigate and develop mathematical theory The Little Book of Bigger Primes Paulo Ribenboim,2006-06-01 A deep understanding of prime numbers is one of the great challenges in mathematics In this new edition fundamental theorems challenging open problems and the most recent computational records are presented in a language without secrets The impressive wealth of material and references will make this book a favorite companion and a source of inspiration to all readers Paulo Ribenboim is Professor Emeritus at Queen s University in Canada Fellow of the Royal Society of Canada and recipient of the George P lya Award of the Mathematical Association of America He is the author of 13 books and more than 150 research articles From the reviews of the First Edition Number Theory and mathematics as a whole will benefit from having such an accessible book exposing advanced material There is no question that this book will succeed in exciting many new people to the beauty and fascination of prime numbers and will probably bring more young people to research in these areas Andrew Granville Zentralblatt **Problem-Solving and Selected Topics in Number Theory** Michael Th. Rassias,2010-11-16 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 *Acta Mathematica Universitatis Ostraviensis* ,2005 **Discrete Geometry and Mathematical Morphology** Étienne Baudrier,Benoît Naegel,Adrien Krähenbühl,Mohamed Tajine,2022-10-20 This book constitutes the proceedings of the Second IAPR International Conference on Discrete Geometry and Mathematical Morphology DGMM 2022 which was held during October 24 27 2022 in Strasbourg France The 33 papers included in this volume were carefully reviewed and selected from 45 submissions They were organized in topical sections as follows discrete and combinatorial topology discrete tomography and inverse problems multivariate and PDE based mathematical morphology morphological filtering hierarchical and Graph Based Models Analysis and Segmentation discrete geometry models transforms and visualization learning based morphology to Mathematical Morphology and distance transform The book also contains 3 invited keynote papers Emerging Security

Algorithms and Techniques Khaleel Ahmad, M. N. Doja, Nur Izura Udzir, Manu Pratap Singh, 2019-05-20 Cyber security is the protection of information systems hardware software and information as well from theft damages interruption or misdirection to any of these resources In other words cyber security focuses on protecting computers networks programs and data in use in rest in motion from unauthorized or unintended access change or destruction Therefore strengthening the security and resilience of cyberspace has become a vital homeland security mission Cyber security attacks are growing exponentially Security specialists must occupy in the lab concocting new schemes to preserve the resources and to control any new attacks Therefore there are various emerging algorithms and techniques viz DES AES IDEA WAKE CAST5 Serpent Algorithm Chaos Based Cryptography McEliece Niederreiter NTRU Goldreich Goldwasser Halevi Identity Based Encryption and Attribute Based Encryption There are numerous applications of security algorithms like cyber security web security e commerce database security smart card technology mobile security cloud security digital signature etc The book offers comprehensive coverage of the most essential topics including Modular Arithmetic Finite Fields Prime Number DLP Integer Factorization Problem Symmetric Cryptography Asymmetric Cryptography Post Quantum Cryptography Identity Based Encryption Attribute Based Encryption Key Management Entity Authentication Message Authentication Digital Signatures Hands On SageMath This book serves as a textbook reference book for UG PG PhD students Teachers Researchers and Engineers in the disciplines of Information Technology Computer Science and Engineering and Electronics and Communication Engineering

Class Groups of Number Fields and Related Topics Kalyan Chakraborty, Azizul Hoque, Prem Prakash Pandey, 2024-12-02 This book collects original research papers and survey articles presented at two conferences on the same theme the International Conference on Class Groups of Number Fields and Related Topics held at Kerala School of Mathematics Kozhikode Kerala India from 21-24 October 2021 and then from 21-24 November 2022 It presents the fundamental research problems that arise in the study of class groups of number fields and related areas The book also covers some new techniques and tools to study these problems Topics in this book include class groups of number fields units Ankeny Artin Chowla conjecture Iwasawa theory elliptic curves Diophantine equations partition functions Diophantine tuples congruent numbers Carmichael ideals in a number field and their connection with class groups This book will be a valuable resource for graduate students and researchers in mathematics interested in class groups of number fields and their connections to other branches of mathematics It also attracts new researchers to the field and young researchers will benefit immensely from the diverse problems discussed in this book All the contributing authors are leading academicians scientists and profound researchers This book is dedicated to Prof Michel Waldschmidt a renowned French number theorist on his 75th birthday

Duality for Nonconvex Approximation and Optimization Ivan Singer, 2007-03-12 The theory of convex optimization has been constantly developing over the past 30 years Most recently many researchers have been studying more complicated classes of problems that still can be studied by means of convex

analysis so called anticonvex and convex anticonvex optimizaton problems This manuscript contains an exhaustive presentation of the duality for these classes of problems and some of its generalization in the framework of abstract convexity This manuscript will be of great interest for experts in this and related fields

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web these ions are called spectator ions because they do not participate in the actual reaction canceling the spectator ions gives the net ionic equation which shows only those species that participate in the chemical reaction $2\text{Ag}^+ \text{aq} + \text{CrO}_4^{2-} \text{aq} \rightarrow \text{Ag}_2\text{CrO}_4 \text{s}$

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web jan 29 2020 the ionic form of this reaction is $2\text{Na}^+ \text{aq} + 2\text{Cl}^- \text{aq} + \text{Cu}^{2+} \text{aq} + \text{SO}_4^{2-} \text{aq} \rightarrow 2\text{Na}^+ \text{aq} + \text{SO}_4^{2-} \text{aq} + \text{CuCl}_2 \text{s}$ the sodium ions and sulfate ion are the spectator ions in this reaction they appear unchanged in both the product and reactant side of the equation

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web mar 11 2014 solution ionic equation $\text{H}^+ \text{aq} + \text{Cl}^- \text{aq} + \text{Na}^+ \text{aq} + \text{HCO}_3^- \text{aq} \rightarrow \text{Na}^+ \text{aq} + \text{Cl}^- \text{aq} + \text{H}_2\text{O} \text{l} + \text{CO}_2 \text{g}$ the spectator ions are Cl^- and Na^+ net ionic equation $\text{H}^+ \text{aq} + \text{Cl}^- \text{aq} + \text{Na}^+ \text{aq} + \text{HCO}_3^- \text{aq} \rightarrow \text{Na}^+ \text{aq} + \text{Cl}^- \text{aq} + \text{H}_2\text{O} \text{l} + \text{CO}_2 \text{g}$ $\text{H}^+ \text{aq} + \text{HCO}_3^- \text{aq} \rightarrow \text{H}_2\text{O} \text{l} + \text{CO}_2 \text{g}$ here is a video on spectator ions *chapter 8 04 ionic equations chemistry libretexts* - Mar 06 2023

web the six $\text{NO}_3^- \text{aq}$ ions and the six $\text{Na}^+ \text{aq}$ ions that appear on both sides of the equation are spectator ions that can be canceled to give the net ionic equation $3\text{Ba}^{2+} \text{aq} + 2\text{PO}_4^{3-} \text{aq} \rightarrow \text{Ba}_3(\text{PO}_4)_2 \text{s}$

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web these spectator ions ions whose presence is required to maintain charge neutrality are neither chemically nor physically changed by the process and so they may be eliminated from the equation to yield a more succinct representation called a

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total ionic equations so you know in a case chemical reactions are described with chemical equations which symbolically present the starting materials end products

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web the equation below is the final net ionic equation after elimination of the spectator ions which yields water $\text{h}^+ \text{aq} + \text{oh}^- \text{aq} \rightarrow \text{h}_2\text{O} \text{l}$ the spectator ions in $\text{KOH} \text{aq}$ and $\text{HNO}_3 \text{aq}$ are $\text{K}^+ \text{aq}$ and $\text{NO}_3^- \text{aq}$ how to identify and list the

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web the $\text{Ag}^+ \text{aq}$ and $\text{Cl}^- \text{aq}$ ions become $\text{AgCl} \text{s}$ but the $\text{Na}^+ \text{aq}$ ions and the $\text{NO}_3^- \text{aq}$ ions stay as $\text{Na}^+ \text{aq}$ ions and $\text{NO}_3^- \text{aq}$ ions these two ions are examples of spectator ions ions that do nothing in the overall course of a chemical reaction

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web aug 8 2022 a spectator ion is an ion that does not take part in the chemical reaction and is found in solution both before and after the reaction the net ionic equation is the chemical equation that shows only those elements compounds and ions that are directly involved in the chemical reaction

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web jun 2 2023 the spectator ions are cut out from a reaction hence the net ionic equation for the above reaction would be $2\text{Cl}^- + \text{Cu}^{2+} + 2\text{Cl}^- + \text{Cu}^{2+} \rightarrow 2\text{Cl}^- + \text{Cu}^{2+} + 2\text{Cl}^- + \text{Cu}^{2+}$ these spectator ions are not actively involved in the reaction the existence of spectator ions affects the debye length

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