

# Algebra & Number Theory 2011/12

**:: Editor's Pick**

Series on Knots and Everything – Vol. 49

## HOPF ALGEBRAS

by **David E Radford**

(University of Illinois at Chicago, USA)

The book provides a detailed account of basic coalgebra and Hopf algebra theory with emphasis on Hopf algebras which are pointed, semisimple, quasitriangular, or are of certain other quantum groups. It is intended to be a graduate text as well as a research monograph.

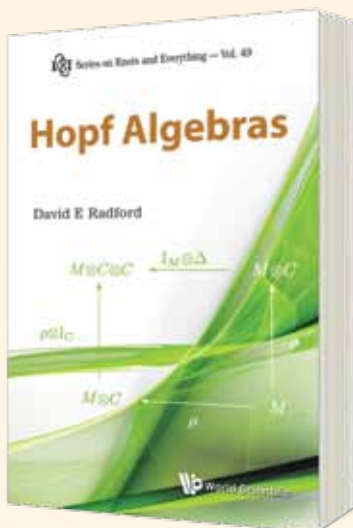
**Contents:** Coalgebras; Representations of Coalgebras; Filtrations and Gradings on Coalgebras; Bialgebras; The Convolution Algebra; Hopf Algebras; Hopf Modules and Co-Hopf Modules; Hopf Algebras as Modules Over Their Hopf Subalgebras; Integrals; Actions by Bialgebras and Hopf Algebras; Quasitriangular Bialgebras and Hopf Algebras; The Drinfel'd Double; Co-Quasitriangular Bialgebras and Hopf Algebras; Pointed Hopf Algebras; Finite-Dimensional Hopf Algebras Over a Field of Characteristic Zero.

592pp

Feb 2012

978-981-4335-99-7

US\$105 £69



**:: Bestselling Textbook**

## ABSTRACT ALGEBRA

**An Introduction to Groups, Rings and Fields**

by **Clive Reis** (University of Western Ontario, Canada)

This book is appropriate for second to fourth year undergraduates. In addition to the material traditionally taught at this level, the book contains several applications: Polyá–Burnside Enumeration, Mutually Orthogonal Latin Squares, Error-Correcting Codes and a classification of the finite groups of isometries of the plane and the finite rotation groups in Euclidean 3-space. It is hoped that these applications will help the reader achieve a better grasp of the rather abstract ideas presented and convince him/her that pure mathematics, in addition to having an austere beauty of its own, can be applied to solving practical problems.

**Contents:** Logic and Proofs; Set Theory; Cartesian Products, Relations, Maps and Binary Operations; The Integers; Groups; Further Properties of Groups; The Symmetric Groups; Rings, Integral Domains and Fields; Polynomial Rings; Field Extensions; Latin Squares and Magic Squares; Group Actions, the Class Equation and the Sylow Theorems; Isometries; Polyá–Burnside Enumeration; Group Codes.

508pp

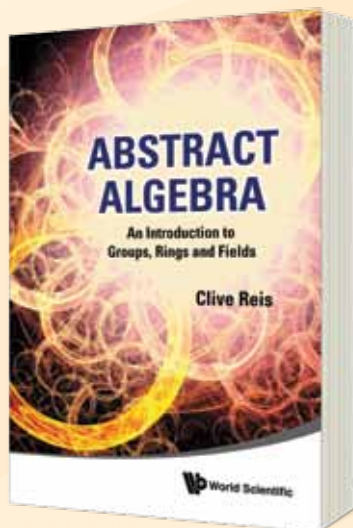
May 2011

978-981-4335-64-5

US\$140 £92

978-981-4340-28-1 (pbk)

US\$70 £46



**:: Highly Recommended**

## GEOMETRIC MODULAR FORMS AND ELLIPTIC CURVES

Second Edition

by **Haruzo Hida**

(University of California, Los Angeles, USA)

**Review of the First Edition:**

*“... this is a welcome addition to the literature in a field difficult to penetrate. This book should obviously be carefully studied by advanced students and by professional mathematicians in arithmetic algebraic geometry or (modern) number theory.”*

**Mathematical Reviews**

This book provides a comprehensive account of the theory of moduli spaces of elliptic curves (over integer rings) and its application to modular forms. The construction of Galois representations, which play a fundamental role in Wiles’ proof of the Shimura–Taniyama conjecture, is given. In addition, the book presents an outline of the proof of diverse modularity results of two-dimensional Galois representations (including that of Wiles), as well as some of the author’s new results in that direction.

**Contents:** An Algebro-Geometric Tool Box; Elliptic Curves; Geometric Modular Forms; Jacobians and Galois Representations; Modularity Problems.

468pp

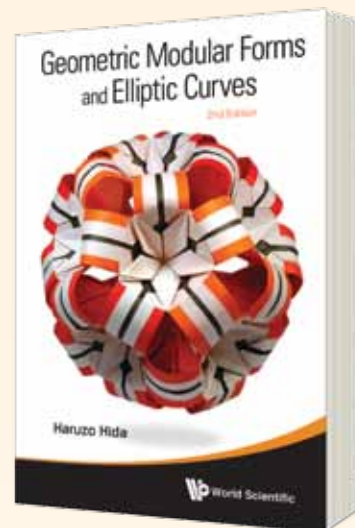
Jan 2012

978-981-4368-64-3

US\$118 £78

978-981-4368-65-0 (ebook)

US\$153



## COHERENT SYSTEMS ON ALGEBRAIC CURVES

by **Peter Newstead** (*University of Liverpool, UK*)

The book provides a state-of-the-art description of the construction and properties of coherent systems on algebraic curves and their moduli spaces, including many results based on the research works of the author and his collaborators. This is a developing theory which generalizes the classical theory of linear systems and has applications to higher rank Brill–Noether theory, and projective embeddings of curves and syzygies.

**Contents:** Definitions and Construction of Moduli Spaces; Basic Properties; Construction Methods and Flips; Coherent Systems in Genus 0; Coherent Systems in Genus 1; Existence of Coherent Systems in Higher Genus; Irreducibility and Smoothness of the Moduli Spaces; Special Results for Rank 2; Special Curves.

**200pp** **Dec 2012**  
**978-981-4304-17-7** **US\$74** **£51**  
**978-981-4304-18-4(ebook)** **US\$96**

## GALOIS ALGEBRAS AND THEIR REPRESENTATIONS

by **Vyacheslav Futorny** (*University of São Paulo, Brazil*) & **Serge Ovsienko** (*Kiev University, Ukraine*)

The book provides a comprehensive overview of the theory of Galois algebras and their representations developed by the authors. It gives a unique treatment of the theory of Gelfand–Tsetlin modules for finite  $W$ -algebras, including the universal enveloping algebra of  $\mathfrak{gl}(n)$ , a new treatment of an analog of the Gelfand–Kirillov Conjecture for finite  $W$ -algebras, and a description of important new theory of Galois algebras.

The book will be of interests to those who specialize in Lie theory, Representation theory and Ring theory.

**200pp** **May 2012**  
**978-981-4299-22-0** **US\$68** **£42**  
**978-981-4299-23-7(ebook)** **US\$88**

## NEW DEVELOPMENTS IN THE ADDITIVE THEORY OF PRIME NUMBERS

by **Jianya Liu & Tao Zhan** (*Shandong University, China*)

The Waring–Goldbach problem seeks to represent positive integers satisfying necessary congruence conditions by powers of primes. The circle method of Hardy and Littlewood in combination with the estimates of Vinogradov for exponential sums over primes gives an affirmative answer to the general Waring–Goldbach problem. In recent years, new ideas using the circle method, sieves, and exponential sums have been incorporated into the Waring–Goldbach problem, encouraging remarkable advances. The purpose of this book is to introduce some of these new ideas, illustrated by dealing with the Waring–Goldbach problem for lower degrees.

**200pp** **Dec 2011**  
**978-981-277-592-4** **US\$73** **£51**  
**978-981-277-593-1(ebook)** **US\$95**

Series on Number Theory and Its Applications – Vol. 3

## MULTI-DIMENSIONAL LANGLANDS FUNCTORIALITY PRINCIPLE

**Notes on M M Kapranov’s Work**

by **Kâzım İlhan İkedâ** (*Yeditepe University, Istanbul, Turkey*)

This book aims at providing an introductory, detailed and up-to-date study of Kapranov’s seminal work, “Analogies between topological quantum field theory and Langlands correspondence”, published in 1995, which is the first paper in literature discussing the formal framework and the formulation of higher-dimensional Langlands correspondence, together with closely related recent works of Kazhdan, Parshin and others.

This book will be of interest to researchers and graduate students in number theory and related areas.

**200pp** **Apr 2012**  
**978-981-283-831-5** **US\$65** **£45**  
**978-981-283-832-2(ebook)** **US\$85**

## COMPLEX ANALYSIS IN FREE PROBABILITY THEORY

by **Hari Bercovici & John Williams** (*Indiana University, USA*)

The book will describe those results in free probability which rely on analytic functions of one variable. These results include free versions of many known results about the addition and multiplication of random variables, including characterizations of infinite divisibility and weak limit theorems. The complex analysis necessary for these developments will be presented to the extent that it exceeds standard graduate presentations of the subject.

**250pp** **Mar 2012**  
**978-981-4335-56-0** **US\$68** **£42**  
**978-981-4335-57-7(ebook)** **US\$88**

:: Textbook

## COMPUTATIONAL AND ALGORITHMIC LINEAR ALGEBRA AND $N$ -DIMENSIONAL GEOMETRY

by **Katta G Murty** (*University of Michigan, Ann Arbor, USA*)

This undergraduate textbook on Linear Algebra and  $n$ -Dimensional Geometry, in a self-teaching style, is invaluable for sophomore level undergraduates in mathematics, engineering, business, and the sciences. These are classical subjects on which there are many mathematics books in theorem-proof style, but this unique volume has its focus on developing the mathematical modeling as well as computational and algorithmic skills in students at this level.

**Contents:** Methods for Formulating Real World Problems Using Systems of Simultaneous Linear Equations; Algorithms for Analyzing and Solving These Models; Fundamental Concepts in  $N$ -Dimensional Geometry, Matrices and Determinants; Eigen Values and Eigen Vectors and Their Importance; Software Systems for Linear Algebra Problems.

**572pp** **Feb 2012**  
**978-981-4366-62-5** **US\$134** **£88**  
**978-981-4366-63-2(pbk)** **US\$78** **£51**

## AN INTRODUCTION TO SEMI-TENSOR PRODUCT OF MATRICES AND ITS APPLICATIONS

by **Daizhan Cheng, Hongsheng Qi &**

**Yin Zhao** (*Chinese Academy of Sciences, China*)

A generalization of Conventional Matrix Product (CMP), called the Semi-Tensor Product (STP), is proposed. It extends the CMP to two arbitrary matrices and maintains all fundamental properties of CMP. In addition, it has a pseudo-commutative property, which makes it more superior to CMP. The STP was proposed by the authors to deal with higher-dimensional data as well as multilinear mappings. After over a decade of development, STP has been proven to be a powerful tool in dealing with nonlinear and logical calculations.

**560pp** **Feb 2012**  
**978-981-4374-68-2** **US\$148** **£98**  
**978-981-4374-69-9(ebook)** **US\$192**

## SELECTED WORKS OF GEORGE E ANDREWS (With Commentary)

by **George E Andrews** (*Pennsylvania State University, USA*) &  
edited by **Andrew V Sills** (*Georgia Southern University, USA*)

George E Andrews is the Evan Pugh Professor of Mathematics at Pennsylvania State University. He is also President of the American Mathematical Society (AMS) for the period of 2009–2011. He is a world pioneer in partitions and  $q$ -series and his contributions include more than 250 scientific papers and several books on number theory and the theory of partitions. In 1976 he discovered Ramanujan's Lost Notebook, a finding which changed the shape of modern  $q$ -series research.

Besides giving readers access to George Andrews' most important papers, this volume also provides his background commentary and comprehensive assessment of years of research and findings within the field of integer partitions.

**1100pp** **Dec 2011**  
**978-1-84816-666-0** **US\$298** **£185**  
**978-1-84816-667-7(ebook)** **US\$387**

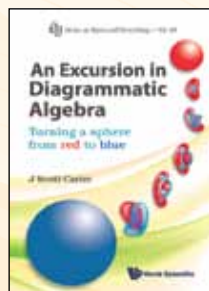
Series on Knots and Everything – Vol. 48

## AN EXCURSION IN DIAGRAMMATIC ALGEBRA

Turning a Sphere from Red to Blue

by **J Scott Carter** (*University of South Alabama, USA*)

The aim of this book is to give as detailed a description as is possible of one of the most beautiful and complicated examples in low-dimensional topology. This example is a gateway to a new idea of higher dimensional algebra in which diagrams replace algebraic expressions and relationships between diagrams represent algebraic relations. The reader may examine the changes in the illustrations in a leisurely fashion; or with scrutiny, the reader will become familiar and develop a facility for these diagrammatic computations.



The text describes the essential topological ideas through metaphors that are experienced in everyday life: shadows, the human form, the intersections between walls, and the creases in a shirt or a pair of trousers. Mathematically informed reader will benefit from the informal introduction of ideas. This volume will also appeal to scientifically literate individuals who appreciate mathematical beauty.

**300pp** **Dec 2011**  
**978-981-4374-49-1** **US\$108** **£71**  
**978-981-4374-50-7(ebook)** **US\$140**

## FIGURATE NUMBERS

by **Michel Deza** (*Ecole Normale Supérieure, Paris, France*) &  
**Elena Deza** (*Moscow State Pedagogical University, Russia*)

Figurate numbers have a rich history with many applications. The main purpose of this book is to provide a thorough and complete presentation of the theory of figurate numbers, giving much of their properties, facts and theorems with full proofs. This book is the first of this topic in unified systematic way. It also contains many exercises with solutions.

**Contents:** Plane Figurate Numbers; Space Figurate Numbers; Multidimensional Figurate Numbers; Areas of Number Theory including Figurate Numbers; Fermat's Polygonal Number Theorem; Zoo of Figurate-related Numbers.

**300pp** **Nov 2011**  
**978-981-4355-48-3** **US\$98** **£64**  
**978-981-4355-49-0(ebook)** **US\$127**

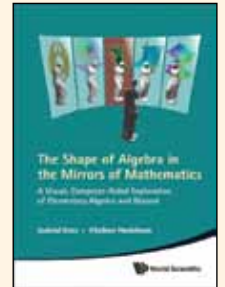
:: Textbook

## THE SHAPE OF ALGEBRA IN THE MIRRORS OF MATHEMATICS

A Visual, Computer-Aided Exploration of  
Elementary Algebra and Beyond  
(With CD-ROM)

by **Gabriel Katz** (*Massachusetts Institute of Technology, USA*) &  
**Vladimir Nodelman** (*Holon Institute of Technology, Israel*)

**Contents:** Maps, Models, and the Coordinate Plane; The Universe of Quadratic Polynomials, the Viète Map, and its Inverse; The Complex Numbers and Other Fields; The Geometry of Complex Linear Polynomial Mappings; Complex Polynomial Maps, Closed Plane Curves, and a Few Topological Exhibits; Geometry of Complex Polynomial Maps of Degree Two and Three; Modular Spaces of Cubic and Quartic Polynomials; Cubic and Quartic Equations: Solutions in Radicals and a Field Theory Trip; Solutions of Cubic Equations in Radicals: their Geometry and Symmetry; The Cubic and Quartic Equations and the Plane Curves; Complex Polynomial Maps of High Degrees and the Fundamental Theorem of Algebra; The Polynomial Kaleidoscope With Holomorphic Mirrors.



**500pp** **Sep 2011**  
**978-981-4313-59-9** **US\$77** **£53**

## GRÖBNER BASES IN RING THEORY

by **Huishi Li** (*Hainan University, China*)

This monograph strives to introduce a solid foundation on the usage of Gröbner bases in ring theory by focusing on noncommutative associative algebras defined by relations over a field  $K$ . It also reveals the intrinsic structural properties of Gröbner bases, presents a constructive PBW theory in a quite extensive context and, along the routes built via the PBW theory, the book demonstrates novel methods of using Gröbner bases in determining and recognizing many more structural properties of algebras, such as the Gelfand–Kirillov dimension, Noetherianity, (semi-)primeness, PI-property, finiteness of global homological dimension, Hilbert series, (non-)homogeneous  $p$ -Koszulity, PBW-deformation, and regular central extension.

**295pp** **Oct 2011**  
**978-981-4365-13-0** **US\$95** **£63**  
**978-981-4365-14-7(ebook)** **US\$124**

:: Textbook

## FINITE FIELDS AND GALOIS RINGS

by **Zhe-Xian Wan** (*Chinese Academy of Sciences, China*)

A large portion of the book can be used as a textbook for graduate and upper level undergraduate students in mathematics, communication engineering, computer science and other fields. The remaining part can be used as references for specialists. Explicit construction and computation of finite fields are emphasized. In particular, the construction of irreducible polynomials and normal basis of finite field is included. A detailed treatment of optimal normal basis and Galois's rings is included. It is the first time that the Galois rings are in book form.

**Contents:** Sets and Integers; Groups; Fields and Rings; Polynomials; Residue Class Rings; Structure of Finite Fields; Further Properties of Finite Fields; Bases; Factoring Polynomials over Finite Fields; Irreducible Polynomials over Finite Fields; Quadratic Forms over Finite Fields; More Group Theory and Ring Theory; Hensel's Lemma and Hensel Lift; Galois Rings.

**388pp** **Sep 2011**  
**978-981-4366-34-2** **US\$78** **£51**  
**978-981-4366-35-9(ebook)** **US\$101**

## THE DESCENT MAP FROM AUTOMORPHIC REPRESENTATIONS OF $GL(n)$ TO CLASSICAL GROUPS

by **David Ginzburg** (Tel Aviv University, Israel),  
**Stephen Rallis** (The Ohio State University, USA) &  
**David Soudry** (Tel Aviv University, Israel)

This book introduces the method of automorphic descent, providing an explicit inverse map to the (weak) Langlands functorial lift from generic, cuspidal representations on classical groups to general linear groups. The essence of this method is the study of certain Fourier coefficients of Gelfand–Graev type, or of Fourier–Jacobi type when applied to certain residual Eisenstein series. This book contains a complete account of this automorphic descent, with complete, detailed proofs. The book will be of interest to graduate students and mathematicians, who specialize in automorphic forms and in representation theory of reductive groups over local fields. Relatively self-contained, the content of some of the chapters can serve as topics for graduate students seminars.



352pp Jun 2011  
978-981-4304-98-6 US\$99 £68  
978-981-4304-99-3(ebook) US\$129

## AN INVITATION TO Q-SERIES

From Jacobi's Triple Product Identity to Ramanujan's "Most Beautiful Identity"

by **Hei-Chi Chan** (University of Illinois at Springfield, USA)

The aim of these lecture notes is to provide a self-contained exposition of several fascinating formulas discovered by Srinivasa Ramanujan. Two central results in these notes are: (1) the evaluation of the Rogers–Ramanujan continued fraction — a result that convinced G H Hardy that Ramanujan was a "mathematician of the highest class", and (2) what G. H. Hardy called Ramanujan's "Most Beautiful Identity". This book covers a range of related results, such as several proofs of the famous Rogers–Ramanujan identities and a detailed account of Ramanujan's congruences. It also covers a range of techniques in q-series.

236pp Apr 2011  
978-981-4343-84-8 US\$99 £64  
978-981-4343-85-5(ebook) US\$129

:: Textbook

## HANDS-ON MATRIX ALGEBRA USING R

Active and Motivated Learning with Applications

by **Hrishikesh D Vinod** (Fordham University, USA)

*"New generations of readers, fluent in computer languages and addicted to the web interfaces will enter effortlessly into the intricate structure of matrices and quadratic forms, with great benefits for their immediate applied mathematical aims. The readers already familiar with theoretical linear algebra will find in the book an invaluable source of examples and novel computer experiments, all illustrating the flexibility and high potential of the language R ... A pure delight to the reader."*

**Mihai Putinar**  
Professor

University of California, Santa Barbara, USA

This is the first book of its kind which teaches matrix algebra, allowing the student to learn the material by actually working with matrix objects in modern computer environment of R. Instead of a calculator, R is a vastly more powerful free software and graphics system.

348pp Mar 2011  
978-981-4313-68-1 US\$105 £68  
978-981-4313-69-8(pbk) US\$52 £34

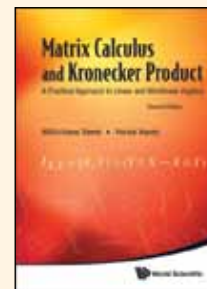
:: Textbook

## MATRIX CALCULUS AND KRONECKER PRODUCT

A Practical Approach to Linear and Multilinear Algebra  
Second Edition

by **Willi-Hans Steeb & Yorick Hardy**  
(University of Johannesburg, South Africa)

This book provides a self-contained and accessible introduction to linear and multilinear algebra. Besides the standard techniques for linear and multilinear algebra many advanced topics are included. Emphasis is placed on the Kronecker product and tensor product. The Kronecker product has widespread applications in signal processing, discrete wavelets, statistical physics, computer graphics, fractals, quantum mechanics and quantum computing. All these fields are covered in detail. A key feature of the book is the many detailed worked-out examples. Computer algebra applications are also given. Each chapter includes useful exercises. The book is well suited for pure and applied mathematicians as well as theoretical physicists and engineers.



324pp Mar 2011  
978-981-4335-31-7 US\$84 £55

:: Study Guide

Major American Universities Ph.D. Qualifying Questions and Solutions – Mathematics

## PROBLEMS AND SOLUTIONS IN MATHEMATICS

Second Edition

edited by **Ta-Tsien Li**  
(Fudan University, China)

This book contains a selection of more than 500 mathematical problems and their solutions from the PhD qualifying examination papers of more than ten famous American universities. The mathematical problems cover six aspects of graduate school mathematics: Algebra, Topology, Differential Geometry, Real Analysis, Complex Analysis and Partial Differential Equations. While the depth of knowledge involved is not beyond the contents of the textbooks for graduate students, discovering the solution of the problems requires a deep understanding of the mathematical principles plus skilled techniques. For students, this book is a valuable complement to textbooks. Whereas for lecturers teaching graduate school mathematics, it is a helpful reference.



804pp Feb 2011  
978-981-4304-95-5 US\$158 £103  
978-981-4304-96-2(pbk) US\$82 £53

Series in Algebra – Vol. 11

## RINGS RELATED TO STABLE RANGE CONDITIONS

by **Huanyin Chen** (Hangzhou Normal University, China)

This monograph is concerned with exchange rings in various conditions related to stable range. Diagonal reduction of regular matrices and cleanness of square matrices are also discussed. Readers will come across various topics: cancellation of modules, comparability of modules, cleanness, monoid theory, matrix theory,  $K$ -theory, topology, amongst others. This is a first-ever book that contains many of these topics considered under stable range conditions. It will be of great interest to researchers and graduate students involved in ring and module theories.

680pp Jan 2011  
978-981-4329-71-2 US\$148 £92  
978-981-4329-72-9(ebook) US\$192

# MATHEMATICAL OLYMPIAD SERIES

Vol. 8 :: Textbook

## LECTURE NOTES ON MATHEMATICAL OLYMPIAD COURSES

For Senior Section (In 2 Volumes)

by Jiagu Xu

(Former Professor of Mathematics, Fudan University, China)

Olympiad mathematics is not a collection of techniques of solving mathematical problems but a system for advancing mathematical education. This book is based on the lecture notes of the mathematical Olympiad training courses conducted by the author in Singapore. Its scope and depth not only covers and beyond the usual syllabus, but introduces a variety of concepts and methods in modern mathematics as well. In each lecture, the concepts, theories and methods are taken as the core. The examples serve to explain and enrich their intentions and to indicate their applications. Besides, appropriate number of test questions is available for the readers' practice and testing purpose. Their detailed solutions are also conveniently provided.

Set		
500pp	Mar 2012	
978-981-4368-94-0(pbk)	US\$68	£45
Vol. 1		
978-981-4368-95-7(pbk)	US\$42	£28
Vol. 2		
978-981-4368-96-4(pbk)	US\$42	£28

Vol. 6 :: Textbook

## LECTURE NOTES ON MATHEMATICAL OLYMPIAD COURSES

For Junior Section (In 2 Volumes)

by Jiagu Xu

(Former Professor of Mathematics, Fudan University, China)

The examples in this book are not very complicated so that readers can easily understand. There are many real competition questions included which students can use to verify their abilities. These test questions are from many countries, e.g. China, Russia, USA, Singapore, etc. In particular, the reader can find many questions from China, if he is interested in understanding mathematical Olympiad in China.

Set		
192pp	Dec 2009	
978-981-4293-53-2(pbk)	US\$40	£30
Vol. 1		
978-981-4293-54-9(pbk)	US\$25	£19
Vol. 2		
978-981-4293-55-6(pbk)	US\$25	£19

Vol. 2 :: Textbook

## PROBLEMS OF NUMBER THEORY IN MATHEMATICAL COMPETITIONS

by Hong-Bing Yu (Suzhou University, China) & translated by Lei Lin (East China Normal University, China)

Number theory is an important research field of mathematics. In mathematical competitions, problems of elementary number theory occur frequently. These problems use little knowledge and have many variations. They are flexible and diverse. In this book, the author introduces some basic concepts and methods in elementary number theory via problems in mathematical competitions. Readers are encouraged to try to solve the problems by themselves before they read the given solutions of examples. Only in this way can they truly appreciate the tricks of problem-solving.

116pp	Sep 2009	
978-981-4271-14-1(pbk)	US\$32	£21

Vol. 7 :: Textbook

## A SECOND STEP TO MATHEMATICAL OLYMPIAD PROBLEMS

by Derek Holton (University of Otago, New Zealand & University of Melbourne, Australia)

The International Mathematical Olympiad (IMO) is an annual international mathematics competition held for pre-collegiate students. It is also the oldest of the international science olympiads, and competition for places is particularly fierce. This book is an amalgamation of the booklets originally produced to guide students intending to contend for placement on their country's IMO team. The material contained in this book provides an introduction to the main mathematical topics covered in the IMO, which are: Combinatorics, Geometry and Number Theory. In addition, there is a special emphasis on how to approach unseen questions in Mathematics, and model the writing of proofs. Full answers are given to all questions.



312pp	Jun 2011	
978-981-4327-87-9(pbk)	US\$38	£24

Vol. 1 :: Textbook

## A FIRST STEP TO MATHEMATICAL OLYMPIAD PROBLEMS

by Derek Holton (University of Otago, New Zealand & University of Melbourne, Australia)

*"This book continues the tradition making national and international mathematical competition problems available to a wider audience and is bound to appeal to anyone interested in mathematical problem solving. The reviewer recommends this book to all students curious about elementary mathematics and how to learn it through solving problems. Teachers would find this book to be a welcome resource for organizing their activities at a high level."*

Zentralblatt MATH

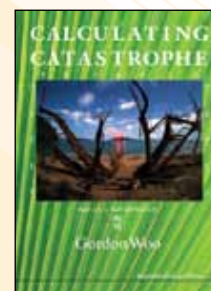
292pp	Jul 2009	
978-981-4273-87-9(pbk)	US\$35	£26

## CALCULATING CATASTROPHE

by Gordon Woo (Risk Management Solutions, USA)

*"It is absolutely excellent and I am thoroughly enjoying it ... I am recommending it to everyone I see."*

Sir John Beddington  
Chief Scientific Adviser to HM  
Government and Head of the Government  
Office for Science, UK



This book has been written to explain, to a general readership, the underlying philosophical ideas and scientific principles that govern catastrophic events, both natural and man-made.

368pp	Jun 2011	
978-1-84816-738-4	US\$79	£52
978-1-84816-739-1(pbk)	US\$29	£19
978-1-84816-740-7(ebook)	US\$103	

Vol. 6

**DEVELOPMENT OF ELLIPTIC FUNCTIONS  
ACCORDING TO RAMANUJAN**by **K Venkatachaliengar** (deceased) edited and  
revised by **Shaun Cooper** (Massey University, New Zealand)

This unique book provides an innovative and efficient approach to elliptic functions, based on the ideas of the great Indian mathematician Srinivasa Ramanujan. The original 1988 monograph of K Venkatachaliengar has been completely revised. Many details, omitted from the original version, have been included, and the book has been made comprehensive by notes at the end of each chapter. The book is for graduate students and researchers in Number Theory and Classical Analysis, as well for scholars and aficionados of Ramanujan's work. It can be read by anyone with some undergraduate knowledge of real and complex analysis.

184pp                                      Sep 2011  
978-981-4366-45-8                      US\$64    £42  
978-981-4366-46-5(ebook)            US\$83

Vol. 5

**HECKE'S THEORY OF MODULAR FORMS  
AND DIRICHLET SERIES****Second Printing with Revisions**by **Bruce C Berndt** (University of Illinois at Urbana-Champaign, USA) &  
**Marvin I Knopp** (Temple University, USA)

In 1938, at the Institute for Advanced Study, E Hecke gave a series of lectures on his theory of correspondence between modular forms and Dirichlet series. Since then, the Hecke correspondence has remained an active feature of number theory and, indeed, it is more important today than it was in 1936 when Hecke published his original papers.

This book is an amplified and up-to-date version of the former author's lectures at the University of Illinois at Urbana-Champaign, based on Hecke's notes. Providing many details omitted from Hecke's notes, it includes various new and important developments in recent years. In particular, several generalizations and analogues of the original Hecke theory are briefly described in this concise volume.

156pp                                      Dec 2007  
978-981-270-635-5                      US\$70    £46

Vol. 2

:: Textbook

**TOPICS IN NUMBER THEORY**by **Minking Eie** (National Chung Cheng University, Taiwan)

*"This is a fine book, interesting both to students who want to get into the subject as well as for experienced researchers."*

**Winfried Kohnen**  
Prof Dr  
University of Heidelberg, Germany

*"This book is not too technical and should be appropriate as a textbook for graduate students in number theory."*

Mathematical Reviews

This is a first-ever textbook written in English about the theory of modular forms and Jacobi forms of several variables. It contains the classical theory as well as a new theory on Jacobi forms over Cayley numbers developed by the author from 1990 to 2000. Applications to the classical Euler sums are of special interest to those who are eager to evaluate double Euler sums or more general multiple zeta values. The celebrated sum formula proved by Granville in 1997 is given in a more general form here.

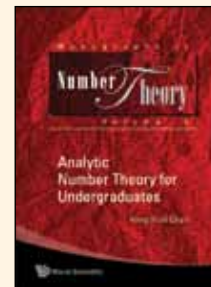
296pp                                      Dec 2008  
978-981-283-518-5                      US\$82    £54

Vol. 3

:: Textbook

**ANALYTIC NUMBER THEORY FOR  
UNDERGRADUATES**by **Heng Huat Chan** (National University of Singapore)

*"This is a true textbook, i.e., a book of texts that the instructor can expand on ... The book is well-produced, pleasing to the eye, and has almost no typographical errors ... I know of nowhere else that so many important results can be found so clearly presented in so small a space ... I hope that it will be adopted, or used as a supplement, by instructors of graduate-level courses."*



See Full Review  
MAA Reviews

*"Each chapter concludes with several exercises which should help the reader gain a better understanding of the material and techniques presented in the respective chapter."*

Zentralblatt MATH

128pp                                      Apr 2009  
978-981-4271-35-6                      US\$73    £48  
978-981-4271-36-3(pbk)              US\$38    £25

Vol. 4

:: Textbook

**NUMBER THEORY****An Elementary Introduction Through Diophantine Problems**by **Daniel Duverney** (Baggio Engineering School, France)

This textbook presents an elementary introduction to number theory and its different aspects: approximation of real numbers, irrationality and transcendence problems, continued fractions, diophantine equations, quadratic forms, arithmetical functions and algebraic number theory. These topics are covered in 12 chapters and more than 200 solved exercises.

348pp                                      Sep 2010  
978-981-4307-45-1                      US\$78    £51  
978-981-4307-46-8(pbk)              US\$34    £22

Vol. 1

:: Lecture Notes

**ANALYTIC NUMBER THEORY****An Introductory Course (Reprinted 2009)**by **Paul T Bateman** & **Harold G Diamond**  
(University of Illinois at Urbana-Champaign, USA)

*"This is a nice introductory book on analytic number theory for students or readers with some background in real analysis, complex analysis, number theory and abstract algebra ... There are various exercises throughout the entire book. Moreover, at the end of each chapter, historical backgrounds and developments of each particular subject or theorem are given together with references."*

Mathematical Reviews

*"This book is suitable for beginning graduate students, or possibly even advanced undergraduates."*

Zentralblatt MATH

376pp                                      Sep 2004  
978-981-238-938-1                      US\$110   £68  
978-981-256-080-3(pbk)              US\$61    £40

## JOURNALS

**ALGEBRA COLLOQUIUM (AC)**

Print ISSN: 1005-3867  
<http://www.worldscinet.com/ac>

This is an international mathematical journal founded at the beginning of 1994. It is edited by the Academy of Mathematics & Systems Science, Chinese Academy of Sciences, jointly with Suzhou University, and published quarterly in English in every March, June, September and December. *Algebra Colloquium* carries original research articles of high level in the field of pure and applied algebra. Papers from related areas that have applications to algebra are also considered for publication. This journal aims to reflect the latest developments in algebra and promote international academic exchanges.

**Honorary Editor-in-Chief**

**Zhexian Wan**, *Chinese Academy of Sciences, China*

**Editor-in-Chief**

**Jiping Zhang**, *Peking University, China*

**INTERNATIONAL JOURNAL OF NUMBER THEORY (IJNT)**

Print / Online ISSN: 1793-0421 / 1793-7310  
<http://www.worldscinet.com/ijnt>

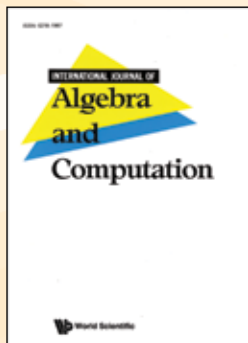
This journal publishes original research papers and review articles on all areas of Number Theory, including elementary number theory, analytic number theory, algebraic number theory, arithmetic algebraic geometry, geometry of numbers, diophantine equations, diophantine approximation, transcendental number theory, probabilistic number theory, modular forms, multiplicative number theory, additive number theory, partitions, and computational number theory.

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**INTERNATIONAL JOURNAL OF ALGEBRA AND COMPUTATION (IJAC)**

Print / Online ISSN: 0218-1967 / 1793-6500  
<http://www.worldscinet.com/ijac>

This journal publishes original papers in mathematics in general, but gives a preference to those in the areas of mathematics represented by the editorial board. Fields of Interest include Combinatorial group theory and semigroup theory; Universal algebra; Algorithmic and computational problems in algebra; Theory of automata; Formal language theory; Theory of computation and Theoretical computer science.

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**JOURNAL OF ALGEBRA AND ITS APPLICATIONS (JAA)**

Print / Online ISSN: 0219-4988 / 1793-6829  
<http://www.worldscinet.com/jaa>

This journal publishes papers both on theoretical and on applied aspects of Algebra. There is special interest in papers that point out innovative links between areas of Algebra and fields of application. As the field of Algebra continues to experience tremendous growth and diversification, we intend to provide the mathematical community with a central source for information on both the theoretical and the applied aspects of the discipline.

**Executive Editors**

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**S R López-Permouth**, *Ohio University, USA*

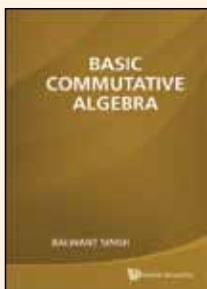
BESTSELLING TEXTBOOKS

**BASIC COMMUTATIVE ALGEBRA**

by **Balwant Singh** (Indian Institute of Technology Bombay, India & UM-DAE Centre for Excellence in Basic Sciences, India)

This textbook, set for a one or two semester course in commutative algebra, provides an introduction to commutative algebra at the postgraduate and research levels. The main prerequisites are familiarity with groups, rings and fields. Proofs are self-contained.

The book will be useful to beginners and experienced researchers alike. The material is so arranged that the beginner can learn through self-study or by attending a course. For the experienced researcher, the book may serve to present new perspectives on some well-known results, or as a reference.



404pp Jan 2011  
 978-981-4313-61-2 US\$99 £64  
 978-981-4313-62-9 (pbk) US\$46 £30

IISc Lecture Notes Series – Vol. 1

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*“This monograph is possibly unique in offering at the graduate level an equally balanced, detailed, thoroughly integrated and relatively advanced combination of core topics in commutative algebra and algebraic geometry. The material is well-illustrated with examples. Moreover there is a wide range of exercises, many of them informative and some quite challenging ... the wealth of material (and knowledge) on offer to the reader of this very stimulating and informative book.”*

Mathematical Reviews

**Contents:** Finitely Generated Algebras; The  $K$ -Spectrum and the Zariski Topology; Prime Spectra and Dimension; Schemes; Projective Schemes; Regular, Normal and Smooth Points; Riemann–Roch Theorem.

220pp Mar 2010  
 978-981-4304-56-6 US\$82 £54  
 978-981-4307-58-1 (pbk) US\$44 £29

**A COURSE ON ABSTRACT ALGEBRA**

by **Minking Eie & Shou-Te Chang** (National Chung Cheng University, Taiwan)

*“This set is the result of an effort to bring together the latest results and planning activities related to earth and space science in Asia and the international arena. The main purpose of this set is to highlight the scientific issues essential to the study of earthquakes, tsunami, atmospheric dust storms, climate change, drought, floods, typhoons, monsoons, space weather, and planetary exploration.”*

Mathematical Reviews

This textbook is more accessible and less ambitious than most existing books covering the same subject. Readers will also find the pedagogical material very useful in enhancing the teaching and learning of abstract algebra.



372pp Feb 2010  
 978-981-4271-88-2 US\$61 £40

**LECTURES ON  $SL_2(\mathbb{C})$ -MODULES**

by **Volodymyr Mazorchuk** (Uppsala University, Sweden)

*“The book under review is intended to be a textbook for an introductory course on representation theory for advanced undergraduate students or first-year graduate students. It will also be a very useful reference for researchers in any of the numerous branches of modern mathematics and theoretical physics that require some knowledge of Lie algebras and their representations.”*

Mathematical Reviews



This book is directed primarily at undergraduate and postgraduate students interested to get acquainted with the representation theory of Lie algebras.

**Contents:** Finite-Dimensional Modules; The Universal Enveloping Algebra; Weight Modules; The Primitive Spectrum; Category  $\mathcal{O}$ ; Description of All Simple Modules; Categorification of Simple Finite-Dimensional Modules.

276pp Dec 2009  
 978-1-84816-517-5 US\$82 £54

**A MATHEMATICAL BRIDGE**

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 Second Edition

by **Stephen Hewson** (University of Cambridge, UK)

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Zentralblatt MATH

**Contents:** Mathematics; Numbers; Analysis; Algebra and Geometry; Calculus and Differential Equations; Probability; Theoretical Physics; **Appendices:** The Historical Development of Mathematics; Great Mathematicians and Their Achievements; Exercises for the Reader; Basic Mathematical Background; Further Reading; Dictionary of Symbols.



672pp Jan 2009  
 978-981-283-407-2 US\$110 £61  
 978-981-283-408-9 (pbk) US\$65 £36

**MODULAR FORMS**

A Classical and Computational Introduction

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This book presents a graduate student-level introduction to the classical theory of modular forms and computations involving modular forms, including modular functions and the theory of Hecke operators.

**Contents:** Historical Overview; Introduction to Modular Forms; Results on Finite-Dimensionality; The Arithmetic of Modular Forms; Applications of Modular Forms; Modular Forms in Characteristic  $p$ ; Computing with Modular Forms; **Appendices:** MAGMA Code for Classical Modular Forms; SAGE Code for Classical Modular Forms; Hints and Answers to Selected Exercises.



236pp Aug 2008  
 978-1-84816-213-6 US\$77 £51

**BASIC LIE THEORY**

by **Hossein Abbaspour** (Max Planck Institut für Mathematik, Germany)  
& **Martin Moskowitz** (The City University of New York, USA)

*"It is as self-contained as possible and introduces the rich world of Lie groups and Lie algebras. Many exercises give the opportunity to learn the subject more deeply."*

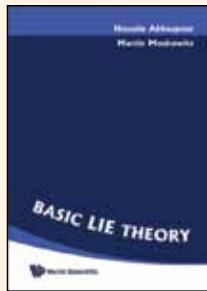
Zentralblatt MATH

*"I recommend this book for everybody starting to apply, learn or teach Lie theory, and also for researchers whose work is related to Lie theory. Anybody who has anything to do with Lie theory should place this book on his/her bookshelf."*

Acta Scientiarum Mathematicarum

This volume provides a comprehensive treatment of basic Lie theory, primarily directed toward graduate study. The text is ideal for a full graduate course in Lie groups and Lie algebras.

444pp	Sep 2007	
978-981-270-698-0	US\$98	£53
978-981-270-699-7 (pbk)	US\$55	£30

**GEOMETRIC LINEAR ALGEBRA****Volume 1**

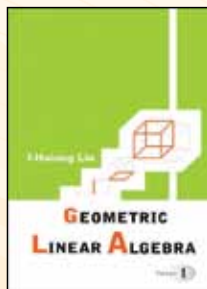
by **I-Hsiung Lin** (National Taiwan Normal University, Taiwan)

*"The clear and inductive approach makes this book unique among existing books on linear algebra both in presentation and in content."*

Zentralblatt MATH

This accessible book for beginners uses intuitive geometric concepts to create abstract algebraic theory with a special emphasis on geometric characterizations. The book applies known results to describe various geometries and their invariants, and presents problems concerned with linear algebra, such as in real and complex analysis, differential equations, differentiable manifolds, differential geometry, Markov chains and transformation groups. The clear and inductive approach makes this book unique among existing books on linear algebra both in presentation and in content.

880pp	Mar 2005	
978-981-256-087-2	US\$157	£104
978-981-256-132-9 (pbk)	US\$86	£57

**REPRESENTATIONS OF FINITE AND LIE GROUPS**

by **Charles B Thomas** (University of Cambridge, UK)

*"This is a straight, very readable introduction to representation theory of finite groups in characteristic 0 case ... this nice booklet can be recommended warmly to anyone who wants to become familiar quickly with group representations."*

Monatshefte für Mathematik

*"The exercises are by no means all routine and are sometimes quite illuminating ... this book is aimed at presenting a traditional introduction to group representations but is more concerned with providing people in other disciplines, algebraic topology in particular, with the basics of what they may need in their researches involving finite and topological groups."*

Zentralblatt MATH

156pp	Oct 2004	
978-1-86094-482-6	US\$78	£51
978-1-86094-484-0 (pbk)	US\$42	£28

**GROUPS, RINGS AND GALOIS THEORY****Second Edition**

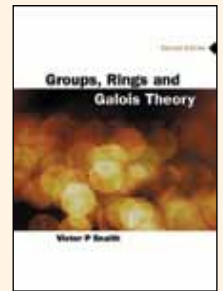
by **Victor P Snaith** (University of Southampton, UK)

*"Certainly, this enlarged second edition of a great primer of abstract algebra has increased its degree of efficiency, in particular in its capacity as an algebraic source for both studying and teaching elementary algebraic number theory. Moreover, this text is and remains a perfect background for the further study of algebra at its more advanced level, and in all its different directions, perhaps so by means of one of the many comprehensive standard books in the field."*

Zentralblatt MATH

This book is ideally suited for a two-term undergraduate algebra course culminating in a discussion on Galois theory. It provides an introduction to group theory and ring theory en route. In addition, there is a chapter on groups — including applications to error-correcting codes and to solving Rubik's cube.

244pp	Nov 2003	
978-981-238-576-5	US\$108	£72
978-981-238-600-7 (pbk)	US\$53	£35

**LECTURES ON ALGEBRA****Volume I**

by **S S Abhyankar** (Purdue University, USA)

*"What is the book good for? The book covers a lot of material for several courses like basic commutative algebra, commutative algebra or algebraic geometry, as well as additional material for basic courses in algebra. It might be used as an encyclopedia for commutative ring theory with a view towards algebraic geometry ... it might be used as a source for inspiration for additional, interesting themes for courses as mentioned above ... It might be recommended to anybody who is willing to see the fascinating, concrete as well as abstract development of algebra during the last centuries, including its applications to algebraic geometry and its potential ... It is a consequence of the author's masterpiece to bring together so many aspects of commutative ring theory. All together, it is not a classical textbook in the style 'groups, rings, fields'. It is a unique, original exposition full of valuable insights."*

Mathematical Reviews  
MAA Online Book Review

756pp	Jul 2006	
978-981-256-826-7	US\$97	£64

**A COURSE IN LINEAR ALGEBRA WITH APPLICATIONS****Second Edition**

by **Derek J S Robinson**

(University of Illinois at Urbana-Champaign, USA)

This is the second edition of the best-selling introduction to linear algebra. Presupposing no knowledge beyond calculus, it provides a thorough treatment of all the basic concepts, such as vector space, linear transformation and inner product. The concept of a quotient space is introduced and related to solutions of linear system of equations, and a simplified treatment of Jordan normal form is given.

**Contents:** Matrix Algebra; Systems of Linear Equations; Determinants; Introduction to Vector Spaces; Basis and Dimension; Linear Transformations; Orthogonality in Vector Spaces; Eigenvectors and Eigenvalues; More Advanced Topics; Linear Programming.

452pp	Aug 2006	
978-981-270-023-0	US\$137	£90
978-981-270-024-7 (pbk)	US\$68	£45

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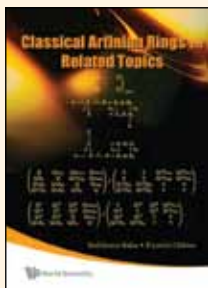
by Yoshitomo Baba (Osaka Kyoiku University, Japan) &amp; Kiyochi Oshiro (Yamaguchi University, Japan)

*"The techniques used are many and varied, with much from previous work of the two authors. They have done a fine job of bringing the material together."*

Mathematical Reviews

**Contents:** A Theorem of Fuller; Harada Rings; The Structure Theory of Left Harada Rings; Self-Duality of Left Harada Rings; Skew Matrix Rings; The Structure of Nakayama Rings; Modules over Nakayama Rings; Nakayama Algebras; Local QF-rings.

312pp Sep 2009  
978-981-4287-24-1 US\$108 £72  
978-981-4287-25-8(ebook) US\$140

**VISTAS OF SPECIAL FUNCTIONS**

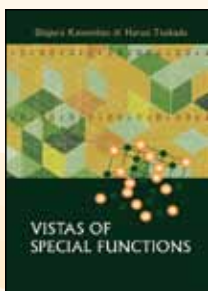
by Shigeru Kanemitsu &amp; Haruo Tsukada (Kinki University, Japan)

*"This book is well structured, clearly written and almost entirely self-contained ... It could be of interest to anyone interested in these topics; it is rather easily accessible to the beginner in the field as well as a valuable reference for those who know the subject matter well. Altogether this is an ideal book for those wishing to start research in this area."*

Mathematical Reviews

This is a unique book for studying special functions through zeta-functions. Many important formulas of special functions scattered throughout the literature are located in their proper positions and readers get enlightened access to them in this book.

228pp Jun 2007  
978-981-270-774-1 US\$93 £61  
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MAA Online Book Review

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Mathematical Reviews

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This book is devoted to the structure of the Mandelbrot set — a remarkable and important feature of modern theoretical physics, related to chaos and fractals and simultaneously to analytical functions, Riemann surfaces, phase transitions and string theory. The Mandelbrot set is one of the bridges connecting the world of chaos and order.

**Contents:** Notions and Notation; Summary; Fragments of Theory; Map  $f(x) = X^2 + c$ : From Standard Example to General Conclusions.

176pp Oct 2006  
978-981-256-837-3 US\$111 £73  
978-981-277-335-7(ebook) US\$144

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by Abraham Berman (Technion - Israel Institute of Technology) &amp; Naomi Shaked-Monderer (Emek Yezteel College, Israel)

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Zentralblatt MATH

*"The topics are of interest mainly from an applied mathematician's point of view, but the techniques and the difficulties make them appealing for the pure mathematician as well."*

Mathematical Reviews

216pp Apr 2003  
978-981-238-368-6 US\$86 £57  
978-981-279-521-2(ebook) US\$112

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by Martin H Krieger (University of Southern California, USA)

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TT Wu

Gordon McKay Professor of Applied Physics &amp; Professor of Physics

472pp Jan 2003  
978-981-238-200-9 US\$157 £104  
978-981-238-206-1(pbk) US\$70 £46  
978-981-279-548-9(ebook) US\$204

Series in Pure Mathematics – Vol. 4

**THE GOLDBACH CONJECTURE****Second Edition**

edited by Yuan Wang (Academia Sinica, China)

*"... this book is a valuable anthology in this research area."*

Zentralblatt für Mathematik

This book provides a detailed description of a most important unsolved mathematical problem — the Goldbach conjecture. Raised in 1742 in a letter from Goldbach to Euler, this conjecture attracted the attention of many mathematical geniuses. Several great achievements were made, but only until the 1920's. The book gives an exposition of these results and their impact on mathematics, particularly, number theory. It also presents (partly or wholly) selections from important literature, so that readers can get a full picture of the conjecture.

344pp Nov 2002  
978-981-238-159-0 US\$136 £89  
978-981-277-660-0(ebook) US\$177



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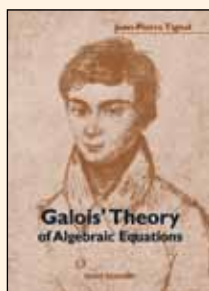
**GALOIS' THEORY OF ALGEBRAIC EQUATIONS**

by **Jean-Pierre Tignol** (Université Catholique de Louvain, Belgium)

*"... it is indeed a methodological masterpiece within the vast existing literature on this subject ... this work is a very welcome addition to the ample literature on classical Galois theory, especially so from the viewpoints of culture, history, and methodology in mathematical science. The author has done a great service to the entire mathematical community."*

Mathematics Abstracts

*"Jean-Pierre Tignol has written a marvelous book. Anyone who wants to learn about the history and methodology of the centuries-long effort to solve algebraic equations should study it carefully. Not only does the author provide a detailed history of the struggles to solve equations, but at each stage he provides enough of the mathematical content so that the mathematically sophisticated reader can actually learn the details of the various solution procedures."*



Mathematical Reviews

*"A pleasant feature is the use of modern notation and terminology to explain the original ideas of Cardano, Viète, Descartes, Newton, Lagrange, Waring, Gauss, Ruffini, Abel, Galois, etc., making the book accessible to any undergraduate student of mathematics, and to any mathematician interested in the historical development of mathematical ideas."*

European Mathematical Society

**Contents:** Quadratic Equations; Cubic Equations; Quartic Equations; The Creation of Polynomials; A Modern Approach to Polynomials; Alternative Methods for Cubic and Quartic Equations; Roots of Unity; Symmetric Functions; The Fundamental Theorem of Algebra; Lagrange; Vandermande; Gauss on Cyclotomic Equations; Ruffini and Abel on General Equations; Galois.

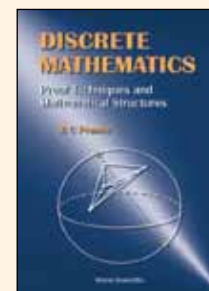
348pp                      Apr 2001  
978-981-02-4541-2(pbk)      US\$49      £32

**DISCRETE MATHEMATICS**

**Proof Techniques and Mathematical Structures**

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**Contents: Part 1:** Proof Techniques; Predicate Calculus; Set Theory; Elementary Number Theory; Relations; Functions; **Part 2:** Cardinality; Elements of Combinatorics; Languages and Finite State Automata; Graphs.

488pp                      Oct 1999  
978-981-02-4088-2              US\$82      £54

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*"... especially useful in the classroom as an illustration of the power of the most fundamental techniques of group theory. Authors of textbooks in group theory should buy it as a must..."*

M Deaconescu  
Mathematics Abstracts

The book is written in a lucid, straightforward style. The subject matter is presented from a student's perspective and constantly demands the student's involvement. Both these strategies are highly appropriate for a book of lecture notes and guarantee the student's understanding of the mathematical concepts.

**Contents:** Introduction; Number-Theoretic Preliminaries; Semidirect Products; Presentations; Calculation of a List of the Groups of Order 1–31; Rewriting and Transfer; Classification of Certain Groups; Cohomology; More Cohomology; Linear Representations; Construction of the Linear Representations; Further Cohomology; Calculation of a List of the Representations of the Groups of Order 1–12.

180pp                      Dec 1994  
978-981-02-1557-6              US\$51      £34  
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