

# Théorie des nombres

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Anders BJÖRNER, Michel LAS VERGNAS, Bernd STURMFELS, Neil WHITE, Günter M. ZIEGLER. — **Oriented matroids**. — Second edition. — Encyclopedia of mathematics and its applications, vol. 46. — Un vol. broché, 15,5×23,5, de xii, 548 p. — ISBN 0-521-77750-X. — Prix: £30.00. — Cambridge University Press, Cambridge, 1999.

Oriented matroids are a very natural mathematical concept which presents itself in many different guises and which has connections and applications to many different areas. These include discrete and computational geometry, combinatorics, convexity, topology, algebraic geometry, operations research, computer science and theoretical chemistry. This is the first comprehensive, accessible account of the subject. For the second edition, the authors have expanded the bibliography greatly to ensure that it remains comprehensive and up-to-date, and they have also added an appendix surveying research since the work was first published.

David M. BRESSOUD. — **Proofs and confirmations: the story of the alternating sign matrix conjecture**. — Spectrum series. — Un vol. broché, 15,5×23, de xv, 274 p. — ISBN 0-521-66646-5. — Prix: £17.95. — Cambridge University Press, Cambridge, 1999.

This is an introduction to recent developments in algebraic combinatorics and an illustration of how research in mathematics actually progresses. The author recounts the story of the search for and discovery of a proof of a formula conjectured in the early 1980s: the number of  $n \times n$  alternating sign matrices, objects that generalize permutation matrices. Although it was soon apparent that the conjecture must be true, the proof was elusive. Researchers became drawn to this problem, making connections to aspects of the invariant theory of Jacobi, Sylvester, Cayley, MacMahon, Schur, and Young, to partitions and plane partitions, to symmetric functions, to hypergeometric and basic hypergeometric series, and, finally, to the six-vertex model of statistical mechanics. All these threads are brought together in Zeilberger's 1995 proof of the original conjecture.

## *Ordre, treillis*

A.M.W. GLASS. — **Partially ordered groups**. — Series in algebra, vol. 7. — Un vol. relié, 16×23, de xiii, 307 p. — ISBN 9810234937. — Prix: £18.00. — World Scientific, Singapore, 1999.

Recently the theory of partially ordered groups has been used by analysts, algebraists, topologists and model theorists. This book presents the most important results and topics in the theory with proofs that rely on (and interplay with) other areas of mathematics. It concludes with a list of some unsolved problems for the reader to tackle. In stressing both the special techniques of the discipline and the overlap with other areas of pure mathematics, the book should be of interest to a wide audience in diverse areas of mathematics. — *Contents*: Definition and examples. — Basic properties. — Values, primes, and polars. — Abelian and normal-valued lattice-ordered groups. — Archimedean function groups. — Soluble right partially ordered groups and generalisations. — Permutations. — Applications. — Completions. — Varieties of lattice-ordered groups. — Unsolved problems.

## *Théorie des nombres*

V.I. BERNIK, M.M. DODSON. — **Metric Diophantine approximation on manifolds**. — Cambridge tracts in mathematics, vol. 137. — Un vol. relié, de ix, 172 p. — ISBN 0-521-43275-8. — Prix: £27.50. — Cambridge University Press, Cambridge, 1999.

This book is concerned with Diophantine approximation on smooth manifolds embedded in Euclidean space, and its aim is to develop a coherent body of theory comparable with that

which already exists for classical Diophantine approximation. In particular this book deals with Khintchine-type theorems and with the Hausdorff dimension of the associated null sets. After setting out the necessary background material, the authors give a full discussion of Hausdorff dimension and its uses in Diophantine approximation. The authors go on to consider briefly the  $p$ -adic case, and they conclude with a chapter on some applications of metric Diophantine approximation.

Henri COHEN. — **Advanced topics in computational number theory.** — Graduate texts in mathematics, vol. 193. — Un vol. relié,  $16 \times 24$ , de xv, 578 p. — ISBN 0-387-98727-4. — Prix: DM 119.00. — Springer, New York, 2000.

This book addresses a number of specific topics in computational number theory centered on class field theory and relative extensions of number fields. Most of the material is new from the algorithmic standpoint. — *Contents*: Fundamental results and algorithms in Dedekind domains. — Basic relative number field algorithms. — The fundamental theorem of global class field theory. — Computational class field theory. — Computing defining polynomials using Kummer theory. — Computing defining polynomials using analytic methods. — Variations on class and unit groups. — Cubic number fields. — Number field table constructions. — Appendices: Theoretical results, electronic information, tables.

H. DAVENPORT. — **The higher arithmetic: an introduction to the theory of numbers.** — Seventh edition. — Un vol. broché,  $15 \times 23$ , de 241 p. — ISBN 0-521-63446-6. — Prix: £16.95 (relié: £45.00). — Cambridge University Press, Cambridge, 1999.

This book is an introduction to the theory of numbers which is suitable for a very wide class of readers. On the one hand, no extensive mathematical knowledge is required of the reader; in fact, a good high-school training in mathematics would be sufficient. On the other hand, the author discusses subjects of real mathematical interest and treats them in a very readable way, so that a person of considerable mathematical maturity would find much enjoyable and profitable reading in this work. Now into its seventh edition and with additional material on computers and number theory, the author introduces concepts and theorems in a way that does not require the reader to have an in depth knowledge of the theory of numbers but also touches upon matters of deep mathematical significance.

Midhat GAZALÉ. — **Number: from Ahmes to Cantor.** — Un vol. relié,  $16 \times 24$ , de xv, 297 p. — ISBN 0-691-00515-X. — Prix: US\$29.95. — Princeton University Press, Princeton, New Jersey, 2000.

In his successor and companion volume to *Gnomon: from pharaohs to fractals* the author takes us on a journey from the ancient worlds of the Egyptians, the Mesopotamians, the Mayas, the Greeks, the Hindus, up to the Arab invasion of Europe and the Renaissance. Our guide introduces us to some of the most fascinating and ingenious characters in mathematical history, from Ahmes the Egyptian scribe through the modern era of Georg Cantor. As he deftly blends together history, mathematics, and even some computer science in his characteristically compelling style, we discover the fundamental notions underlying the acquisition and recording of “number”, and what “number” really means.

Alexander REZNIKOV, Norbert SCHAPPACHER, (Editors). — **Regulators in analysis, geometry and number theory.** — Progress in mathematics, vol. 171. — Un vol. relié,  $16,5 \times 24$ , de xv, 324 p. — ISBN 0-8176-4115-7. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

The focus in this book is on the theory of regulators and secondary invariants, with articles written and refereed by experts in their respective fields. A short historical and mathematical

overview of the theory of regulators from its number theoretic origins, and its connections to analysis, topology, differential geometry, and algebra, is presented by the editors in the introduction, with key topics noted as follows: hyperbolic volume and the Borel regulator, the Chern-Simons invariant, the Bloch-Beilinson regulator, polylogarithms (classical and elliptic), and analytic torsion. This work is an outgrowth of a conference held at the Hebrew University in Jerusalem on *Regulators in Analysis, Geometry and Number Theory*.

James J. TATTERSALL. — **Elementary number theory in nine chapters.** — Un vol. broché, 15×23, de VIII, 407 p. — ISBN 0-521-58531-7. — Prix: £16.95 (relié: £45.00). — Cambridge University Press, Cambridge, 1999.

This book is intended to serve as a one-semester introductory course in number theory. Throughout the book a historical perspective has been adopted and emphasis is given to some of the subject's applied aspects; in particular the field of cryptography is highlighted. At the heart of the book are the major number theoretic accomplishments of Euclid, Fermat, Gauss, Legendre, and Euler, and to fully illustrate the properties of numbers and concepts developed in the text, a wealth of exercises has been included. It is assumed that the reader will have "pencil in hand" and ready access to a computer.

### *Corps et polynômes*

Juan J. MORALES RUIZ. — **Differential Galois theory and non-integrability of Hamiltonian systems.** — Progress in mathematics, vol. 179. — Un vol. relié, 16×24, de xiv, 165 p. — ISBN 3-7643-6078-X. — Prix: SFr. 88.00. — Birkhäuser, Basel, 1999.

This book is devoted to the relation between two different concepts of integrability: the complete integrability of complex analytical Hamiltonian systems and the integrability of complex analytical linear differential equations. The connection of these two integrability notions is given by the variational equation (i.e. linearized equation) along a particular integral curve of the Hamiltonian system. The underlying heuristic idea, which motivated the main results presented in this monograph, is that a necessary condition for the integrability of a Hamiltonian system is the integrability of the variational equation along any of its particular integral curves. The necessary background on differential Galois theory and Hamiltonian systems is included, and several new problems and conjectures which open new lines of research are proposed.

### *Géométrie algébrique*

H. FLENNER, L. O'CARROLL, W. VOGEL. — **Joins and intersections.** — Springer monographs in mathematics. — Un livre relié, 16×24, de vi, 307 p. — ISBN 3-540-66319-3. — Prix: DM 149.00. — Springer, Berlin, 1999.

The central topic of the book is refined intersection theory and its applications, the basic tool of investigation being the Stückrad-Vogel intersection algorithm, based on join construction. This algorithm is used to present a general version of Bézout's theorem, in classical and refined form. Connections with the intersection theory of Fulton-MacPherson are treated, using work of van Gastel employing Segre classes. Bertini theorems and connectedness theorems form another major theme, as do various measures of multiplicity. The hope is that the book will inform algebraists of important methods from algebraic geometry and widen the interest of geometers in recent relevant advances in commutative algebra.