

# Logique et fondements

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D.A.R. WALLACE. — **Groups, rings and fields.** — Springer undergraduate mathematics series. — Un vol. broché, VIII, 248 p. — ISBN 3-540-76177-2. — Prix: DM 58.00. — Springer, London, 1998.

David Wallace has written a text on modern algebra which is suitable for a first course in the subject given to mathematics undergraduates. It aims to promote a feeling for the evolutionary and historical development of algebra. It assumes some familiarity with complex numbers, matrices and linear algebra which are commonly taught during the first year of an undergraduate course. Each chapter contains examples, exercises and solutions, perfectly suited to aid self-study.

Paul ZEITZ. — **The art and craft of problem solving.** — Un vol. relié,  $20 \times 24,5$ , de XVII, 334 p. — ISBN 0-471-13571-2. — Prix: £ 19.99. — John Wiley & Sons, Inc., New York, 1999.

This is a book about mathematical problem solving, for college-level novices. The book is divided into two parts. Part I is an overview of problem-solving methodology, and is the core of the book. Part II contains four chapters, that can be read independently of one another, which outline algebra, combinatorics, number theory, and calculus from the problem solver's point of view.

## *Histoire*

Norman L. BIGGS, E. Keith LLOYD, Robin J. WILSON. — **Graph theory: 1736-1936.** — Reprinted with corrections. — Un vol. broché,  $16 \times 23,5$ , de X, 239 p. — ISBN 0-19-853916-9. — Prix: £ 25.00. — Clarendon Press, Oxford, 1998.

Building on a set of original writings from some of the founders of graph theory, the book traces the historical development of the subject through a linking commentary. The relevant underlying mathematics is also explained, providing an original introduction for students. Appendices give a brief account of developments since 1936, biographical information, and a comprehensive bibliography.

Paul J. NAHIN. — **An imaginary tale: the story of square root of minus one.** — Un vol. relié,  $16 \times 24$ , de XVI, 257 p. — ISBN 0-691-02795-1. — Prix: US\$ 24.95. — Princeton University Press, Princeton, 1998.

In the book, Paul Nahin tells 2000-year-old history of one of mathematics' most elusive numbers, the square root of minus one, also known as  $i$ , re-creating the baffling mathematical problems that conjured it up and the colorful characters who tried to solve them. Addressing readers with both a general and scholarly interest in mathematics, the author weaves into this narrative entertaining historical facts, mathematical discussions, and the application of complex numbers and functions to important problems, such as Kepler's laws of planetary motion and ac electrical circuits. This book can be read as an engaging history, almost a biography, of one of the most evasive and pervasive "numbers" in all mathematics.

## *Logique et fondements*

Xavier CAICEDO, Carlos H. MONTENEGRO, (Editors). — **Models, algebras, and proofs.** — Selected papers of the X Latin American symposium on mathematical logic held in Bogotá. — Lecture notes in pure and applied mathematics, vol. 203. — Un vol. broché,  $17,5 \times 25,5$ , de XIII, 448 p. — ISBN 0-8247-1970-0. — Prix: US\$ 165.00. — Marcel Dekker, Inc., New York, 1999.

Featuring original research and timely surveys by over 30 known experts worldwide, this book provides a thorough discussion of generic and end extensions of models of set theory...

relations between combinatorics and choice principles... model theory beyond first order-applications to stability in Banach spaces, well-founded and non-well-founded inductive definitions, and algorithmic complexity theory... general properties of algebraizable logics... geometric aspects of Lukasiewicz logics... logic of algebraic specification of software... the strength of various proof system... new logical paradigms brought forth by advances in artificial intelligence... etc.

Yu. L. ERSHOV, S.S. GONCHAROV, A. NERODE, J.B. REMMEL, (Editors), V.W. MAREK, (Associate editor). — **Handbook of recursive mathematics, Vol. 1: Recursive model theory.** — Studies in logic and the foundations of mathematics, vol. 138. — Un vol. relié, 15,5×23, de XLV, 620 p. — ISBN 0-444-50003-0. — Prix: Dfl. 225.00. — North-Holland, Amsterdam, 1998.

*Contents:* Introduction to the Handbook of Recursive Mathematics (Yu.L. Ershov, S.S. Goncharov, A. Nerode, J.B. Remmel). Pure computable model theory (V.S. Harizanov). Elementary theories and their constructive models (Yu.L. Ershov, S.S. Goncharov). Isomorphic recursive structures (C.J. Ash). Computable classes of constructive models (V.P. Dobritsa).  $\Sigma$ -definability of algebraic structures (Yu.L. Ershov). Autostable models and algorithmic dimensions (S.S. Goncharov). Degrees of models (J.F. Knight). Groups of computable automorphisms (A.S. Morozov). Constructive models of finitely axiomatizable theories (M.G. Peretyat'kin). Complexity theoretic model theory and algebra (D.Cenzer, J.B. Remmel). A bibliography of recursive algebra and recursive model theory (I. Kalantari). A bibliography of recursive analysis and recursive topology (V. Brattka, I. Kalantari).

Yu. L. ERSHOV, S.S. GONCHAROV, A. NERODE, J.B. REMMEL, (Editors), V.W. MAREK (Associate editor). — **Handbook of recursive mathematics, Vol. 2: Recursive algebra, analysis and combinatorics.** — Studies in logic and the foundations of mathematics, vol. 139. — Un vol. relié, de 15,5×23, de XLV, 623-1372 p. — ISBN 0-444-50106-1, (set, vol. 1 & 2, 0-444-50107-X). — Prix: Dfl. 275.00 (set, vol. 1 & 2, Dfl. 450.00). — North-Holland, Amsterdam, 1998.

*Contents:*  $\Pi_1^0$  classes in mathematics (D. Cenzer, J.B. Remmel). Computability theory and linear orderings (R.G. Downey). Computable algebras and closure systems: coding properties (R.G. Downey, J.B. Remmel). A survey of recursive combinatorics (W. Gasarch). Constructive Abelian groups (N.G. Khisamiev). Recursive and on-line graph coloring (H.A. Kierstead). Polynomial-time computability in analysis (K. Ko). Generally constructive Boolean algebras (S.P. Odintsov). Reverse algebra (S.G. Simpson, J. Rao).

Peter FLETCHER. — **Truth, proof and infinity: a theory of constructions and constructive reasoning.** — Synthese library: studies in epistemology, logic, methodology, and philosophy of science, vol. 276. — Un vol. relié, 17×25, de ix, 469 p. — ISBN 0-7923-5262-9. — Prix: Dfl. 290.00. — Kluwer Academic Publishers, Dordrecht, 1998.

Constructive mathematics is based on the thesis that the meaning of a mathematical formula is given, not by its truth-conditions, but in terms of what constructions count as a proof of it. However, the meaning of the terms “construction” and “proof” has never been adequately explained. This monograph develops precise definitions of construction and proof, and describes the algorithmic substructure underlying intuitionistic logic. Interpretations of Heyting arithmetic and constructive analysis are given. The philosophical basis of constructivism is explored thoroughly in Part I. The author seeks to answer objections from platonists and to reconcile his position with the central insights of Hilbert’s formalism and logic.

Martin GOLDSTEN, Haim JUDAH. — **The incompleteness phenomenon: a new course in mathematical logic.** — Un vol. broché, 15,5×23, de XIII, 247 p. — ISBN 1-56881-093-8. — Prix: US\$39.00. — A.K. Peters, Natick, Massachusetts, 1998.

What is “the truth”? In our continual striving for precision and order, we have often relied on mathematics to provide us with the answer to this long-standing question. The basic phenomenon of mathematical logic is that every reasonable mathematical system is intrinsically incomplete; there will always be mathematical problems that we cannot solve. This premise is the result of Gödel’s well-known incompleteness theorem, and it is the main paradigm of this book. To supplement the concepts explored, the authors have provided exercises at the end of each section.

Robert GOLDBLATT. — **Lectures on the hyperreals: an introduction to nonstandard analysis.** — Graduate texts in mathematics, vol. 188. — Un vol. relié, 16×24, de XIV, 287 p. — ISBN 0-387-98464-X. — Prix: DM 98.00. — Springer, New York, 1998

This is an introduction to nonstandard analysis based on a course of lectures given by the author. It presents nonstandard analysis not just as a theory about infinitely small and large numbers but as a radically different way of viewing many standard mathematical concepts and constructions; a source of new ideas, objects and proofs, and a wellspring of powerful new principles of reasoning (transfer, overflow, saturation, enlargement, hyperfinite approximation, etc.). Features of the text include an early introduction of the ideas of internal, external, and hyperfinite sets, and a set-theoretic approach to enlargement more axiomatic than the usual one based on superstructures.

Giovanni SAMBIN, Jan M. SMITH, (Editors). — **Twenty-five years of constructive type theory.** — Proceedings of a Congress held in Venice, October 1995. — Oxford logic guides, vol. 36. — Un vol. relié, 16×24, de VII, 283 p. — ISBN 0-19-850127-7. — Prix: £60.00. — Clarendon Press, Oxford, 1998.

Martin-Löf type theory is both an important and practical formalization and a focus for a charismatic view of the foundations of mathematics. Per Martin-Löf’s work has been of huge significance in the fields of logic and the foundations of mathematics, and has important applications in areas such as computing science and linguistics. This volume celebrates the twenty-fifth anniversary of the birth of the subject. Also published for the first time is one of Per Martin-Löf’s earliest papers. *Contents:* Yet another constructivization of classical logic. — Extension of Martin-Löf’s type theory with record types. — Type-theoretical checking and philosophy of mathematics. — The Hahn-Banach theorem in type theory. — A realizability interpretation of Martin-Löf’s type theory. — The groupoid interpretation of type theory. — An intuitionistic theory of types. — Analytic program derivation in type theory. — About storage operators. — On universes in type theory. — How to believe a machine-checked proof. — Building up a toolbox for Martin-Löf’s type theory: subset theory. — An introduction to well-ordering proofs in Martin-Löf’s type theory. — Variable-free formalization of the Curry-Howard theory. — The forget-restore principle: a paradigmatic example.

Arturo SANGALLI. — **The importance of being fuzzy: and other insights from the border between math and computers.** — Un vol. relié, 16,5×24, de XVI, 173 p. — ISBN 0-691-00144-8. — Prix: US\$24.95. — Princeton University Press, Princeton, 1998.

In this book, the author explains the uses of fuzzy logic, a technique allowing computers the luxury of imprecision and releasing them from the bonds of the absolute. By using fuzzy logic and related concepts, programmers have been able to sidestep the traditional and often

cumbersome search for perfect mathematical solutions to embrace instead solutions which are “good enough”. Computers have brought new practicality to mathematics and mathematical applications, and if mathematicians want their work to be relevant to the problems of the modern world they must increasingly recognize “the importance of being fuzzy”, Sangalli warns.

## **Analyse combinatoire**

Daniel BENEST, Claude FORESCHLÉ, (Editors). — **Analysis and modelling of discrete dynamical systems**. — Advances in discrete mathematics and applications, vol. 1. — Un vol. relié, 16×23,5, de x, 319 p. — ISBN 90-5699-625-8. — Prix: £45.00. — Gordon and Breach Science Publishers, Amsterdam, distributed by Marston Book Services, Abingdon, Oxon, U.K., 1998.

The theory of discrete dynamical systems, or mappings, has important applications in a number of domains of modern physics, including celestial mechanics and fluid mechanics. This volume provides a comprehensive introduction to the general study of mappings, with particular emphasis on their applications to the dynamics of the solar system. Featuring chapters based on lectures delivered by a panel of international experts at the School on Discrete Dynamical Systems (February 1996, Aussois, France), this book offers graduate students and researchers in the field a single source for information that, until now, has been available only in widely dispersed journal articles.

Stephen B. MAURER, Anthony RALSTON. — **Discrete algorithmic mathematics**. — Second edition. — Un vol. relié, 19×24, de XIX, 884 p. — ISBN 1-56881-091-1. — Prix: US\$59.00. — A.K. Peters, Natick, Massachusetts, 1998.

Written in a clear and lively style, the book's emphasis is on themes and ideas, making it coherent and extensive. Special features include: extensive and detailed study of algorithms, emphasis on the recursive and inductive paradigms, thorough coverage of topics like difference equations, probability, and logic, a large number of problems with a hints and answers section and a complete index.

Bruce E. SAGAN, Richard P. STANLEY, (Editors). — **Mathematical essays in honor of Gian-Carlo Rota**. — Progress in mathematics, vol. 161. — Un vol. relié, 16×24, de IX, 463 p. — ISBN 3-7643-3872-5. — Prix: SFr. 148.00. — Birkhäuser, Boston, 1998.

The mathematical essays in this volume pay tribute to Gian-Carlo Rota on the occasion of his 64<sup>th</sup> birthday. The breadth and depth of Rota's interests, research, and influence are reflected in such areas as combinatorics, invariant theory, geometry, algebraic topology, representation theory, and umbral calculus, the latter being the subject of a paper coauthored by Rota himself. Other important areas of research that are touched in this outstanding collection include special functions, commutative algebra, and statistics.

Richard P. STANLEY. — **Enumerative combinatorics, vol. 2**. — Cambridge studies in advanced mathematics, vol. 62. — Un vol. relié, 16×23,5, de XII, 581 p. — ISBN 0-521-56069-1. — Prix: £45.00. — Cambridge University Press, Cambridge, 1999.

This volume covers the composition of generating functions, trees, algebraic generating functions,  $D$ -finite generating functions, noncommutative generating functions, and symmetric functions. The chapter on symmetric functions provides the only available treatment of this subject suitable for an introductory graduate course and focusing on combinatorics, especially