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QUARTERLY OF APPLIED MATHEMATICS

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SUGGESTIONS CONCERNING THE PREPARATION OF MANUSCRIPTS FOR THE QUARTERLY OF APPLIED MATHEMATICS

The editors will appreciate the authors' cooperation in taking note of the following directions for the preparation of manuscripts. These directions have been drawn up with a view toward eliminating unnecessary correspondence, avoiding the return of papers for changes, and reducing the charges made for "author's corrections."

Manuscripts: Manuscripts should be typewritten double-spaced on one side only. Marginal instructions to the typesetter should be written in pencil to distinguish them clearly from the body of the text. The author should keep a complete copy.

The papers should be submitted in final form. Only typographical errors should be corrected in proof; composition charges for any major deviations from the manuscript will be passed on to the author.

Titles: The title should be brief but express adequately the subject of the paper. The name and initials of the author should be written as he/she prefers; all titles and degrees or honors will be omitted. The name of the organization with which the author is associated should be given in a separate line following his/her name.

Mathematical Work: As far as possible, formulas should be typewritten; Greek letters and other symbols not available on the average typewriter should be inserted using either instant lettering or by careful insertion in ink. Manuscripts containing pencilled material other than marginal instructions to the typesetter will not be accepted.

The difference between capital and lower-case letters should be clearly shown; care should be taken to avoid confusion between zero (0) and the letter O, between the numeral one (1), the letter l and the prime ($'$), between alpha and a, kappa and k, nu and u, nu and v, eta and n.

The level of subscripts, exponents, subscripts to subscripts, and exponents to exponents should be clearly indicated.

Single embellishments over individual letters are allowed; the only embellishment allowed above groups of letters is the overbar.

Double embellishments are not allowed. These may be replaced by superscripts following the symbols.

Complicated exponents and subscripts should be avoided. Any complicated expression that recurs frequently should be represented by a special symbol.

For exponentials with lengthy or complicated exponents the symbol exp should be used, particularly if such exponentials appear in the body of the text. Thus,

$$\exp[(a^2 + b^2)^{1/2}] \text{ is preferable to } e^{[a^2+b^2]^{1/2}}$$

Fractions in the body of the text and fractions occurring in the numerators or denominators of fractions should be written with the solidus. Thus,

$$\frac{\cos(x/2b)}{\cos(a/2b)} \text{ is preferable to } \frac{\cos\frac{x}{2b}}{\cos\frac{a}{2b}}.$$

In many instances the use of negative exponents permits saving of space. Thus,

$$\int u^{-1} \sin u \, du \text{ is preferable to } \int \frac{\sin u}{u} \, du.$$

Whereas the intended grouping of symbols in handwritten formulas can be made clear by slight variations in spacing, this procedure is not acceptable in typeset formulas. To avoid misunderstanding, the order of symbols should therefore be carefully considered. Thus,

$$(a + bx)\cos t \text{ is preferable to } \cos t(a + bx).$$

Figures: Figures should be drawn in black ink with clean, unbroken lines; do not use ball point pen. The paper should be of a nonabsorbant quality so that the ink does not spread and produce fuzzy lines. If the figures are intended for reduction, they should be drawn with heavy enough lines so that they do not become flimsy at the desired reduction. The notation should be of professional quality and in proportion for the expected reduction size. Figures which are unsuitable for reproduction will be returned to the author for redrawing. Legends accompanying figures should be written on a separate sheet.

Bibliography: References should be grouped together in a Bibliography at the end of the manuscript. References in text to the Bibliography should be made by numerals between square brackets.

The following examples show the desired arrangements: (*for books*—S. Timoshenko, *Strength of materials*, vol. 2, Macmillan and Co., London, 1931, p. 237; *for periodicals*—Lord Rayleigh, *On the flow of viscous liquids, especially in three dimensions*, Phil. Mag. (5) 36, 354-372 (1893)). Note that the number of the series is not separated by commas from the name of the periodical or the number of the volume.

Authors' initials should precede their names rather than follow them.

In quoted titles of books or papers, capital letters should be used only where the language requires this. Thus, *On the flow of viscous fluids* is preferable to *On the Flow of Viscous Fluids*, but the corresponding German title would have to be rendered as *Über die Stromung zaher Flüssigkeiten*.

Titles of books or papers should be quoted in the original language (with an English translation added in parentheses, if this seems desirable), but only English abbreviations should be used for bibliographical details such as ed., vol., no., chap., p.

Footnotes: As far as possible, footnotes should be avoided. Footnotes containing mathematical formulas are not acceptable.

Abbreviations: Much space can be saved by the use of standard abbreviations such as Eq., Eqs., Fig., Sec., Art., etc. These should be used, however, only if they are followed by a reference number. Thus, "Eq. (25)" is acceptable but not "the preceding Eq." Moreover, if any one of these terms occurs as the first word of a sentence, it should be spelled out.

Special abbreviations should be avoided. Thus "boundary conditions" should always be spelled out and not be abbreviated as "b.c." even if this special abbreviation is defined somewhere in the text.

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Vol. LI, No. 1 **March 1993**

Continual Means and Boundary Value Problems in Function Spaces. By Efim M. Polishuk. Birkhäuser-Boston, 1988. 160 pp., $42.00.

This is Volume 31 in the series Operator Theory: Advances and Applications. It is concerned with theory of integration in infinite-dimensional spaces (i.e., "continual means") and its applications to boundary value problems for function domains. It represents the development of Paul Levy's ideas. Chapter headings: 1. Functional classes and function domains. Mean values. Harmonicity and the Laplace operator in function spaces; 2. The Laplace and Poisson equations for a normal domain; 3. The functional Laplace operator and classical diffusion equations. Boundary value problems for uniform domains. Harmonic controlled systems; 4. General elliptic functional operators on functional rings.

Number Theory, Trace Formulas and Discrete Groups. Edited by Karl Egil Aubert, Enrico Bombieri, and Dorian Goldfeld. Academic Press, 1989. xviii+510 pp., $69.95.

This volume constitutes the proceedings of a symposium in honor of Atle Selberg, held in Oslo, Norway, July 14–21, 1987. There is a historical introduction, entitled Prehistory of the Zeta-Function, by André Weil, and there are seven survey lectures on Selberg's work: by James Arthur (the trace formula and Hecke operator), Enrico Bombieri (Selberg's sieve and its applications), Daniel Bump (the Rankin-Selberg method: a survey) , Herve Jacquet (on the base change problem), R. P. Langlands (Eisenstein series, the trace formula and the modern theory of automorphic forms), Hugh Montgomery (Selberg's work on the Zeta function), G. D. Mostow (Selberg's work on the arithmeticity of lattices and its ramifications). There are also the texts of 21 other invited talks.

Boolean Functions with Engineering Applications and Computer Programs. By Winfrid G. Schneeweiss. Springer-Verlag, 1989. xii+264 pp., $35.00.

This book is aimed at providing a sufficiently deep understanding of results in Boolean function theory that are useful in practical work and in applied research. Chapter headings: 1. Notation and glossary; 2. Fundamental concepts; 3. Diagrams for Boolean analysis; 4. Representations (forms) and types of Boolean functions; 5. Minimal disjunctive normal forms; 6. Boolean difference calculus; 7. Boolean functions without Boolean operators; 8. Stochastic theory of Boolean functions; 9. Stochastic theory of Boolean indicator processes; 10. Some algorithms and computer programs for Boolean analysis; 11. Appendix: probability theory refresher.

Integrable Systems of Classical Mechanics and Lie Algebras, Volume I. By A. M. Perelomov. Birkhäuser-Boston, Inc., 1990. 320 pp., $83.00.

This is a translation by A. G. Reyman from the author's Russian manuscript. The book is designed to present, from a general and universal standpoint, a variety of methods and results concerning integrable systems of classical mechanics. By such systems the author understands Hamiltonian systems with a finite number of degrees of freedom possessing sufficiently many conserved quantities (integrals of motion) so that in principle integration of the corresponding equations of motion can be reduced to quadratures, i.e., to evaluating integrals of known functions. Until recently, only a small number of such systems with two or more degrees of freedom was known. In the last fifteen years, however, remarkable progress has been made due to the invention of a new approach to the integration of nonlinear evolution equations known as the inverse scattering method. In mechanics, this revealed the complete integrability of numerous classical systems, all related to Lie algebras. This book consists of two volumes and is the first attempt to give a systematic exposition of the results in this field previously available only in periodicals.

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Finite Difference Schemes and Partial Differential Equations. By John C. Strikwerda. Wadsworth & Brooks/Cole Mathematics Series, 1989. xii+386 pp., $47.95.

This text presents the basic theory of finite difference schemes applied to the numeric solution of partial differential equations and is designed to be used as an introductory graduate text. The chief motivation for this text was the author's desire to present the material on time-dependent equations, Chapters 1 through 11, in a unified way—these chapters contain much that is not in any textbook. Moreover, the unified treatment, using Fourier analysis, emphasizes that one can study finite difference schemes using a few powerful ideas. Chapter headings: 1. Hyperbolic p.d.e.'s; 2. Analysis of finite difference schemes; 3. Order of accuracy of finite difference schemes; 4. Stability for multistep schemes; 5. Dissipation and dispersion; 6. Parabolic p.d.e.'s; 7. Systems of p.d.e.'s in higher dimensions; 8. Second-order equations; 9. Analysis of well-posed and stable problems; 10. Convergence of initial value problems; 11. Well-posed and stable initial-boundary value problems; 12. Elliptic p.d.e.'s and difference schemes; 13. Linear iterative methods; 14. The method of steepest descent and the conjugate gradient method.

Regression Estimators: A Comparative Study. By Marvin H. J. Gruber. Academic Press, 1990. xi+347 pp., $49.95.

This is a volume in the series Statistical Modeling and Decision Science. The goal of this book is to present, compare, and contrast the development and the properties of the ridge type regressors that result from the Bayesian and from the non-Bayesian point of view, the best estimators being derivable by both methods. The book is divided into four parts. The first part (Chapters 1 and 2) explores the need for alternatives to least square estimators, gives a historical survey of the literature and summarizes basic ideas in matrix theory and statistical decision theory used throughout the book. The second part (Chapters 3 and 4) presents the estimators from both the Bayesian and from the frequentist points of view and explores the mathematical relationships between them. The third part (Chapters 5–8) considers the efficiency of the estimators with and without averaging over a prior distribution. Part 4 (Chapters 11 and 12) suggests applications of the methods and results of Chapters 3–7 to Kalman filters and analysis of variance. In addition to the theoretical results, numerical examples are given to illustrate how the theoretical results work in practice. There are over 100 exercises.

Basic Algebra II, Second Edition. By Nathan Jacobson. W. H. Freeman and Company, 1989. xvii+686 pp., $47.95.

The most extensive changes in this second edition of the text first published in 1980 occur in Chapters 7, 8, and 9. The chapter headings are: 1. Categories; 2. Universal algebra; 3. Modules; 4. Basic structure theory of rings; 5. Classical representation theory of finite groups; 6. Elements of homological algebra with applications; 7. Commutative ideal theory: General theory and Noetherian rings; 8. Field theory; 9. Valuation theory; 10. Dedekind domains; 11. Formally real fields.

Sequences: Combinatorics, Compression, Security, and Transmission. Edited by Renato M. Capocelli. Springer-Verlag, 1990. xii+549 pp., $49.50.

This volume contains all the papers presented at an Advanced International Workshop held June 6–11 in Naples and in Positano, Italy. The 43 papers are divided into five parts: Combinatorial algorithms; Combinatorics; Compression; Security; Transmission.

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Computability: Computable Functions, Logic and the Foundations of Mathematics. By Richard L. Epstein and Walter A. Carnielli. Wadsworth & Brooks/Cole, 1989. xvii+295 pp., $50.95.

This book addresses the question why the theory of computable functions was developed before there were any computers. Its 26 chapters are divided into four parts: 1. The fundamentals; 2. Computable functions; 3. Logic and arithmetic; 4. Church's thesis and constructive mathematics. Parts 1 and 2 constitute the mathematical development. In part 2, the authors describe the notion of computability, present the Turing machine model, and then develop the theory of partial recursive functions through the Normal Form theorem. Part 3 begins with propositional logic and gives an overview of predicate logic and Gödel's theorems. A full development of the syntactic part of first-order logic and Gödel's theorems follows. Part 1 gives the philosophic background for discussions about the foundations of mathematics while presenting the notions of whole number, function, proof, and real number. Part 4 considers the significance of the technical work with a discussion of Church's Thesis and constructivity in mathematics. In addition to serving as a text, the book is also an anthology of fourteen classic readings by Hilbert, Gödel, Turing, Post, Church, and others. Solutions to the exercises are available in an Instructor's Manual, which also contains suggestions for course outlines.

An Introduction to the Numerical Analysis of Spectral Methods. By Bertrand Mercier. Springer-Verlag, 1989. v+154 pp., $23.30.

This is Volume 318 of Lecture Notes in Physics. It is a translation of report CEA-N-2278, dated 1981, of the French Atomic Energy Commission. In the numerical approach subsumed under the term *Spectral Methods* the solution of a partial differential equation is approximated by a truncated series of special functions which are the eigenfunctions of some differential operator. Part A of this monograph is devoted to Fourier series. In part B the restriction of periodic boundary conditions is relaxed: the main tool is to work with polynomials of degree less than or equal to N.

Discrete Relaxation Techniques. By Thomas C. Henderson. Oxford University Press, 1989. 146 pp., $29.95.

This is a volume in The International Series of Monographs on Computer Science. Relaxation techniques have been used extensively in solving certain numerical analysis problems since they were introduced by Sir Richard Southwell fifty years ago. In this book, the authors describe recent developments in the application of relaxation methods to finite domains. Thus the origin of the term "discrete relaxation". These techniques have found wide application in artificial intelligence and computer vision. The major goals of this book are to provide the formal foundations of these techniques, to provide some examples of their application, and finally to summarize the state-of-art algorithms, both sequential and parallel, and special purpose architectures for performing discrete relaxation.

Andreotti-Grauert Theory by Integral Formulas. By Gennadi M. Henkin and Jürgen Leiterer. Birkhäuser-Boston, 1988. 270 pp., $44.90.

This is Volume 74 in the series Progress in Mathematics. The authors develop in detail the basic facts on the Cauchy-Riemann cohomology of complex manifolds.

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Mathematical Methods for Construction of Queueing Models. By V. V. Kalashnikov and S. T. Rachev. Wadsworth & Brooks/Cole, 1990. ix+430 pp.

This translation of a Russian monograph is a volume in the Wadsworth & Brooks/Cole Operations Research Series. It is based on the theory of probability metrics (measures of the distance between distribution functions) and its application to the stability of stochastic models. Queueing models are constructed based only on the observed input data, and the concepts of identification, continuity, and stability of queuing systems are discussed within the framework of general characterization problems. Chapter headings: 1. Substantive formulation of the problem of queueing model construction; 2. The concept of characterization as a general mathematical schema for constructing queueing models; 3. Probability metrics; 4. Characterization of the components of queueing models; 5. Methods of analysis of the continuity of queueing models; 6. Construction of queueing models from observations of their inputs—direct problems of characterization; 7. Identification of individual queueing models from observations of output data—inverse characterization problems; 8. Simplification and approximation of probability models.

The Monte Carlo Method for Semiconductor Device Simulation. By C. Jacoboni and P. Lugli. Springer-Verlag, 1989. 356 pp., $98.00.

This is a volume in the series Computational Microelectronics. It contains all the information necessary to set up a Monte Carlo simulator, starting from the knowledge of basic transport physics and continuing up to the general principles of the Monte Carlo technique and its applications to the simulation of semiconductor devices. Chapter headings: 1. Introduction; 2. Charge transport in semiconductors; 3. The Monte Carlo simulations; 4. Review of semiconductor devices; 5. Monte Carlo simulation of semiconductor devices; 6. Applications.

Newton to Aristotle: Toward a Theory of Models for Living Systems. Edited by John Casti and Anders Karlqvist. Birkhäuser-Boston, Inc., 1989. 285 pp., $49.00.

These are the formal written versions of the papers presented at a workshop in Abisco, Sweden, May 4–8, 1987. There are papers by the editors and by Robert Rosen (necessity in biology), René Thom (causality and finality in biology), Jan Willems (modeling), Michael Conrad (force, measurement, and life), Gerald Silverberg (patterns of evolution and explanation in economics), Andras Brody (growth cycles in economics), and David Lightfoot (modeling language change).

Latent Variable Path Modeling with Partial Least Squares. By Jan-Bernd Lohmöller. Physica Verlag, Heidelberg, 1989. 283 pp., $58.40.

The core of this monograph (Chapter 3) is devoted to the statistical foundation of the Herman Wold's Partial Least Squares (PLS) method, by a recapitulation of Wold's predictor specification for one relation; by a reconstruction of the psychometric factor score problem from the PLS theory; by a unifying view on several traditional two-block models like canonical analysis; and by the introduction of the Split Principal Component Theorem as a basis for reflections on properties of multi-block models. Chapter headings: 1. Basic principles of model building; 2. The basic and the extended PLS method; 3. Foundations of Partial Least Squares; 4. Mixed measurement level multivariate data; 5. Predictive vs. structural modeling: PLS vs. Maximum Likelihood; 6. Latent variables three-mode path analysis; 7. PLS programs and applications.

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Stochastic Integration and Differential Equations: A New Approach. By Philip Protter. Springer-Verlag, 1990. x+302 pp., $49.00.

This is Volume 21 of the series Applications of Mathematics. The novelty of this approach is that the author defines a semimartingale as a stochastic process which is a "good integrator" on an elementary class of processes, rather than as a process that can be written as the sum of a local martingale and an adapted process with paths of finite variation on compacts. This approach has the advantage over the customary approach of not requiring a close analysis of the structure of martingales as a prerequisite. It also gives traditionally difficult and nonintuitive theorems transparently simple proofs. The chapter headings are: 1. Preliminaries; 2. Semimartingales and stochastic integrals; 3. Semimartingales and decomposable processes; 4. General stochastic integration and local times; 5. Stochastic differential equations.

Depth Perception in Frogs and Toads: A Study in Neural Computing. By Donald House. Springer-Verlag, 1989. vii+135 pp., $16.20.

This is volume 80 in the series Lecture Notes in Biomathematics. It provides a comprehensive exploration of the phenomenon of depth perception in frogs and toads, as seen from a neuro-computational point of view. It develops and presents two neurally realizable depth perception algorithms that utilize both monocular and binocular depth cues in a cooperative fashion. It also reviews the known neuroanatomical, neurophysiological, and behavioral data, and then synthesizes, organizes, and interprets that information to explain a complex sensory-motor task.

A Calculus for Factorial Arrangements. By Sudhir Gupta and Rahul Mukerjee. Springer-Verlag, 1989. vi+126 pp., $16.20.

This more or less self-contained monograph is Volume 59 in the series Lecture Notes in Statistics. It aims at presenting a survey of the developments since the 1970s relating to the tensor calculus for factorial arrangements, involving the Kronecker product of matrices, introduced by Kurkjian, Zelen, and Federer in the early 1960s. Chapter headings: 1. Introduction; 2. A calculus for factorial arrangements; 3. Characterizations for balance with orthogonal structure; 4. Characterizations for orthogonal factorial structure; 5. Constructions I: Factorial experiments in cyclic and generalized cyclic designs; 6. Constructions II: Designs based on Kronecker type products; 7. More on single replicate factorial designs; 8. Further developments.

Elements of Functional Analysis. Second Edition. By I. J. Maddox. Cambridge University Press, 1989. xii+242 pp., $59.50 cloth, $22.95 paper.

This is the second edition of the text first published in 1970. Many topics have been clarified, more detail has been inserted in explanations and proofs, and further worked examples have been added. There has been a complete revision of the work on convex sets, metric and topological linear spaces, reflexivity, and weak convergence. Also, there is new material on the Wiener algebra of absolutely convergent Fourier series, and on weak topologies, including a proof of Alaoglu's theorem. Elementary applications of functional analysis to differential and integral equations appear in the new final chapter, including a treatment of the Sturm-Liouville problem. Chapter headings: 1. Basic set theory and analysis; 2. Metric and topological spaces; 3. Linear and linear metric spaces; 4. Normed linear spaces; 5. Banach algebras; 6. Hilbert space; 7. Applications.

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Automated Deduction in Nonclassical Logics: Efficient Matrix Proof Methods for Modal and Intuitionistic Logics. By Lincoln A. Wallen. The MIT Press, 1990. 239 pp., $35.00.

This book develops and demonstrates efficient matrix proof methods for automated deduction with an important and comprehensive class of first-order and intuitionistic logics. Traditional techniques for the design of efficient proof systems are abstracted from their original setting: this allows their application to a wider class of mathematical logic. The eight chapters are divided into three parts: 1. Classical logic; 2. Modal logic; 3. Intuitionistic logic.

Stochastic Differential Equations: An Introduction with Applications, Second Edition. By Bernt Oksendal. Springer-Verlag, 1989. xv+186 pp., $29.95.

This is the second edition of a volume in the series Universitext, first published in 1985. For this edition, the author has split the chapter on diffusion processes into two, the new Chapters 7 and 8. Chapter headings: 1. Introduction; 2. Some mathematical preliminaries; 3. Ito integrals; 4. Stochastic integrals and the Ito formula; 5. Stochastic differential equations; 6. The filtering problem; 7. Diffusions: basic properties; 8. Other topics in diffusion theory; 9. Application to boundary value problems; 10. Application to optimal stopping; 11. Application to stochastic control.

Numerical Techniques in Finance. By Simon Benninga. The MIT Press, 1989. viii+ 244 pp., $19.95.

The aim of this book is to present some important models in finance and to show how they can be solved numerically and/or simulated. The models in the book are solved, and the programs written, in Lotus spreadsheets; where necessary, the Lotus Version 2 macro language is used. The 25 chapters are divided into five parts, the first four addressing various areas of finance and the last part being technical (e.g., the Gauss-Seidel and Newton-Raphson methods, matrices, random number generation, Lotus functions and macros): 1. Corporate finance; 2. Portfolio problems; 3. Options; 4. Duration and immunization; 5. The technical background.

Queueing Networks—Exact Computational Algorithms: A Unified Theory Based on Decomposition and Aggregation. By Adrian Conway and Nicolas D. Georganas. The MIT Press, 1989. x+234 pp., $27.50.

This is a volume in the series Computer Systems. It provides a state-of-the-art view of the field of exact computational algorithms for the analysis of production-form queueing networks in equilibrium. Recent developments are presented within the context of a unified constructive theory based on the general notions of decomposition and aggregation, which provides intuitive insight in the general problem of constructing efficient algorithms and parametric analysis techniques. There are five chapters: 1. Preliminaries; 2. Theory and applications of queueing networks; 3. Decomposition methods in queueing network analysis; 4. A unified constructive theory for exact computational algorithms; 5. Exact computational algorithms for queueing networks.

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Mathematical Approaches to Problems in Resource Management and Epidemiology. Edited by C. Castillo-Chavez, S. A. Levin, and C. A. Shoemaker. Springer-Verlag, 1989. vii+327 pp., $33.00.

This is Volume 81 in the series Lecture Notes in Biomathematics. It is the proceedings of a conference held at Ithaca, N. Y., October 28–30, 1987. The 23 papers are divided into six parts: 1. Cell population dynamics; 2. Resource management; 3. Infectious diseases; 4. Acquired immunodeficiency syndrome (AIDS); 5. Fitting models to data; 6. Dynamic properties of population models.

Mathematical and Statistical Approaches to AIDS Epidemiology. Edited by C. Castillo-Chavez. Springer-Verlag, 1989. viii+405 pp., $47.10.

This volume reflects many of the contributions that statisticians and mathematicians have made to the understanding of HIV disease. The 19 papers are divided into five groups: 1. Statistical methodology and forecasting; 2. Infectivity and the human immunodeficiency virus (HIV); 3. Heterogeneity and HIV transmission dynamics; 4. Social dynamics and AIDS; 5. The immune system and the HIV.

Ontic: A Knowledge Representation System for Mathematics. By David A. McAllester. The MIT Press, 1989. xiv+158 pp., $27.50.

Ontic is a computer system for verifying mathematical arguments. Starting with the axioms of Zermelo-Fraenkel set theory, the Ontic system is used to define concepts involving partial orders and lattices and to verify a proof of the Stone representation theorem for Boolean lattices. The Ontic theorem prover is based on object-oriented inference. The book has two parts: an overview of Ontic, and a part describing its technical details.

Iterative Methods for Large Linear Systems. Edited by David R. Kincaid and Linda J. Hayes. Academic Press, 1990. xviii+319 pp., $54.50.

This book is an outgrowth of a conference held October 19–21, 1988, hosted by the Center for Numerical Analysis of The University of Texas at Austin, in honour of David M. Young, Jr., on the occasion of his 65th birthday. It contains 17 papers from the conference with the objective of providing an overview of the state of the art in the use of iterative methods for solving sparse linear systems. It also contains a biographical sketch of David Young, a list of Master's and Ph.D. theses supervised by him, and a reproduction of a portrait drawn by his sister, Christine Sorenson.

Theory of Finite and Infinite Graphs. By Denes König, translated by Richard McCoart, with commentary by W. T. Tutte. Birkhäuser-Boston Inc., 1990. 432 pp., $75.00.

This is a translation of König's classic text of 1936. The commentary treats each of the fourteen chapters in the book separately and in detail, explaining its significance and putting it into its historical perspective. There is also a biographical sketch of Denes König, by T. Gallai.

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A Transition to Advanced Mathematics, Third Edition. By Douglas Smith, Maurice Eggen, and Richard St. Andre. Brooks/Cole Publishing Company, 1990. $38.00.

This is the third edition of the text first published in 1983. It is designed to forge a link between beginning calculus and a more rigorous level of advanced mathematics, in three ways: it provides a firm foundation in the major ideas needed; it guides students to think and express themselves mathematically; and it introduces modern algebra and analysis in sufficient depth to capture some of their spirit and characteristics.

Multivariate Approximation Theory IV. Edited by C. K. Chui, W. Schempp, and K. Zeller. Birkhäuser Verlag AG, Basel, 1989. ix+342 pp., $63.00.

This is Volume 90 of the International Series of Numerical Mathematics, and constitutes the proceedings of the Conference at the Mathematical Research Institute, Oberwolfach, February 12–18, 1989. The 37 papers are concerned with problems of representation and approximation of real functions of several variables, and practical applications of the theory in various fields.

Perspectives on Nonlinear Dynamics, Volume 1. By E. Atlee Jackson, Cambridge University Press, 1990. xix+493 pp., $59.50.

This book is a comprehensive introduction to the field of nonlinear dynamical models suggested by physical, chemical, biological, fluid, and other systems, from the perspective of analytical, topological, and computational methods. It is designed to be suited to a broad readership. The text is complemented by copious references, extensive historical and bibliographic notes, exercises, and examples. The vast bibliography occupies 80 pages. The presentation and style combine meticulous accuracy with a successful attempt to make each topic exciting and meaningful, to stimulate the reader's imagination and imbue him with a feeling for the importance and relevance of the subject at hand. It is altogether a unique text.

Decomposition and Invariance of Measures, and Statistical Transformation Models. By Ole E. Barndorff-Nielsen, Prben Blaesild, and Poul Svante Eriksen. Springer-Verlag, 1989. 1644 pp., $19.50.

This is volume 58 in the series Lecture Notes in Statistics. It aims to indicate the usefulness of measure, decomposition, and invariance theory for the methodology of statistical transformation models. Chapter headings: 1. Introduction; 2. Topological groups and actions; 3. Matrix Lie groups; 4. Invariant, relatively invariant, and quasi-invariant measures; 5. Decomposition and factorization of measures; 6. Construction of invariant measures; 7. Exterior calculus; 8. Statistical transformation models.

Nonsmooth Optimization and Related Topics. Edited by F. H. Clarke, V. F. Dem′yanov and F. Giannessi. Plenum Press, 1989. xi+489 pp., $120.00.

This is Volume 43 of the Ettore Majorana International Science Series, and contains the edited texts of the 27 lectures presented at the International School of Mathematics devoted to Nonsmooth Optimization, held from June 20 to July 1, 1988, at the Ettore Majorana Centre for Scientific Culture in Erice, Sicily.