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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, mu 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. 3 **September 1993**

Analysis and Partial Differential Equations: A collection of Papers Dedicated to Mischa Cotlar. Edited by Cora Sadosky. Marcel Dekker, 1990. 784 pp., $115.00.

This is Volume 122 of Lecture Notes in Pure and Applied Mathematics. The 34 technical papers in this volume are divided into three parts: 1. Harmonic and complex analysis; 2. Functional analysis and operator theory; 3. Partial differential equations. It also includes Alberto Calderon's introduction of Cotlar to the National Academy of Exact Science of Argentina, "Mischa in Montevideo" by Jose Luis Massera, "My friend Mischa Cotlar" by Manuel Sadosky, a list of Cotlar's mathematical publications, and comments on the early papers (before 1955) of Cotlar's by John Horvath, and on those since 1955 by the editor.

Linear Programming: Methods and Applications. By G. V. Shenoy, John Wiley & Sons, 1989. vi+255 pp., $39.95.

The principal objectives of writing this text are to introduce linear programming techniques to students without background in mathematics, with emphasis on applications to management, economics, engineering, and accountancy. The main emphasis is on the conceptual framework and on applications to decision making in management.

Spinors and Calibrations. By F. Reese Harvey. Academic Press, 1990. xiii+323 pp., $39.95.

This is Volume 9 in the series Perspectives in Mathematics and is intended to be a collection of examples. The (simple) Lie groups, the spin groups for general signatures, the exceptional groups G_2 and F_4, the orbit structure of the simpler representations of these groups, and the special Lagrangian and associated calibrations are all discussed in some detail. The book is divided into two parts: 1. Classical groups and normed algebras; 2. Spinors.

Introduction to Hilbert Spaces with Applications. By Lokenath Debnath and Piotr Mikusinski. Academic Press, 1990. xiv+509 pp., $49.95.

This text, intended for senior undergraduate and graduate courses, presents a systematic exposition of the basic ideas and results of Hilbert space theory and functional analysis with diverse applications to differential and integral equations. The Hilbert space formalism is used to develop the foundation of quantum mechanics, and the Hilbert space methods are applied to optimization, variational and control problems and to problems in approximations theory, nonlinear instability, and bifurcation. There is also a simple introduction to the Lebesgue integral. Chapter headings: 1. Vector spaces; 2. The Lebesgue integral; 3. Hilbert spaces and orthonormal systems; 4. Linear operators on Hilbert spaces; 5. Applications to integral and differential equations; 6. Generalized functions and partial differential equations; 7. Mathematical foundations of quantum mechanics; 8. Optimization problems and other miscellaneous applications.

Introduction to Ordinary Differential Equations, Fourth Edition. By Shepley L. Ross, John Wiley & Sons, 1989. xi+609 pp., $48.16.

This is a new, corrected, and enlarged edition of the well-known text. There are over 300 new exercises, including 160 chapter review exercises.

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Meta-Programming in Logic Programming. Edited by Harvey Abramson and M. H. Rogers. The MIT Press. 544 pp., $50.00.

This volume contains all but a few of the papers presented at a workshop held at the University of Bristol, 22–24 June 1988. The logic programming approach to computing investigates the use of logic as a programming language and explores computational models based on controlled deduction. A meta-program is any program (written in the "meta-language") which treats another program (written in the "object language") as data. When the meta-language and object language are identical, it also includes "meta-circular interpreters", i.e., interpreters for a language which are written in the language being interpreted. A meta-circular interpreter for logic programs and pure Prolog is particularly concise. This interpreter leads into many practical and theoretical issues which are explored in this volume of 28 papers.

Intermediate Mathematical Analysis. By Hugh Thurston. Oxford University Press, 1989. viii+164 pp., $55.00 cloth, $24.95 paper.

This is a volume in the series Oxford Science Publications. This text goes beyond the functions of one variable studied in elementary analysis and deals with functions of several variables. It stops short of functions on abstract spaces. Table of contents: 1. Functions of several variables; 2. Set theory; 3. Continuity; 4. Differentiation; 5. Multiple integration; 6. Further developments.

Ordinary Differential Equations, Fourth Edition. By Garrett Birkhoff and Gian-Carlo Rota. John Wiley & Sons, 1989. xi+399 pp., $67.20.

In this new edition of a well-known text first published in 1959, the first eight chapters have been carefully revised. Without compromising the emphasis on advanced ideas and proofs, the authors have supplied detailed reviews of elementary facts for easy reference. The book falls into three parts: Chapters 1 through 4 constitute a review of material to which the student has probably been exposed in elementary courses; Chapters 5 through 8 deal with systems of nonlinear differential equations, and Chapters 9 through 11 are devoted to the study of second-order linear differential equations (regular singular points, Sturm-Liouville systems, expansions in eigenfunctions).

Mathematical Modelling. By J. N. Kapur. John Wiley & Sons, 1988. xi+259 pp.

This book aims to provide help in answering the question which technique is most appropriate for a particular modelling situation. The first chapter explains the basic principles of modelling and illustrates these with simple examples. Each subsequent chapter deals with mathematical modelling through one or more specific techniques: first order o.d.e.'s ; systems of first-order o.d.e.'s ; second-order o.d.e.'s; difference equations; p.d.e.'s; modelling through graphs; functional, integral, delay-differential, and differential-difference equations; calculus of variations and dynamic programming: mathematical programming, maximum principle, and maximum-entropy principle.

Metric Affine Geometry. By Ernst Snapper and Robert J. Troyer. Dover Publications, 1989. xx + 435 pages. $10.95.

This is an unabridged, corrected republication of the work first published by Academic Press in 1971.

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Descriptive Set Theory and the Structure of Sets of Uniqueness. By Alexander S. Kechris and Alain Louveau. Cambridge University Press, 1987. 367 pp., $34.50.

This is volume 128 of the London Mathematical Society Lecture Notes Series. The study of sets of uniqueness for trigonometric series originated in the work of Riemann, Heine, and Cantor. Since then, it has been used for investigations involving real analysis, classical and abstract harmonic analysis, measure theory, functional analysis, and number theory. In this book, the recently discovered connections of the subject with descriptive set theory are developed. To make the material widely accessible, the authors have covered in some detail large parts of the classical and modern theory of sets of uniqueness as well as the relevant parts of descriptive set theory.

Operator Algebras and Application. Edited by David E. Evans and Masamichi Takesaki. Cambridge University Press, 1989. *Volume* 1: *Structure Theory, K-Theory, Geometry and Topology,* 244 pp., $29.95. *Volume* 2: *Mathematical Physics and Subfactors*, 240 pp., $29.95.

These are Volumes 135 and 136 of the London Mathematical Society Lecture Notes Series. The research and expository articles in these two volumes arise from a year-long symposium held at the Mathematics Institute, University of Warwick, between 1 October 1986 and 29 October 1987, in particular from a UK-US joint seminar on the subject held during 20–25 July 1987.

The Geometry of Jet Bundles. By D. J. Saunders. Cambridge University Press, 1989. 293 pp., $29.95.

This is Volume 142 of the London Mathematical Society Lecture Notes Series. It is its purpose to provide an introduction to the theory of jet bundles for mathematicians and physicists who wish to study differential equations, particularly those associated with the calculus of variations, in a modern geometric way. One of the themes of the book is that first-order jets may be considered as the natural generalization of vector fields for studying variational problems in field theory.

The History of Statistics: *The Measurement of Uncertainty before* 1900. By Stephen M. Stigler. Harvard University Press, 1990. xvi + 410 pages. $14.95 (paper).

This is the first paperback edition of the noted monograph first published in 1986.

An Introduction to Numerical Computations, Second Edition. By Sidney Yakowitz and Ferenc Szidarovszky. Macmillan Publishing Company, 1989. xiv+462 pp.

This is a revision of the text first published in 1986. There are some fundamental changes, taking account of recent developments, for instance in eigenvalue computations, Fourier transform, as well as the addition of more advanced material and of a larger problem set more oriented towards applications. There are seven chapters: 1. Computer representation and roundoff; 2. Simultaneous linear equations; 3. Interpolation; 4. Numerical differentiation and integration; 5. Nonlinear equations; 6. Function approximation and data fitting.

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Fourier Analysis. By T. W. Körner. Cambridge University Press, 1989. xii+591 pp., $34.50.

This is the first paperback edition (with corrections) of the work first published in 1988. In this beautiful, unusual, and original work, the author has tried to write a series of interlinked essays accessible to a student with a good general background in mathematics such as an undergraduate (at a British university) is supposed to have after two years of study—the author wishes the book to be a shopwindow for some of the ideas, techniques, and elegant results of Fourier analysis, rather than a traditional text. Perspicacious historical remarks are liberally interspersed. There are 110 delightful essays (number 110 is "A Word From Our Founder"—a passage from the introduction to *Théorie Analytique de la Chaleur*), arranged under the following headings: 1. Fourier series; 2. Some differential equations; 3. Orthogonal series; 4. Fourier transforms; 5. Further developments; 6. Other directions.

Stochastic Mechanics and Stochastic Processes. Edited by A. Truman and I. M. Davis. Springer-Verlag. 220 pp.

This is Volume 1325 of Lecture Notes in Mathematics. It is the proceedings of a conference held in Swansea, U. K., August 4–8, 1986. Most of the 18 papers are reasonably self-contained and should be readily accessible to researchers in the field. There is also an expository account of large deviations in statistical mechanics by J. T. Lewis.

Search Theory: Some Recent Developments. Edited by David V. and Gregory V. Chudnovsky. Marcel Dekker, 1989. 176 pp., $89.75.

Originating in WW II in attempts to protect allied shipping from enemy submarines, search theory focuses on problems of optimization, game theory, differential games, and statistics. Large scale applications range from deep-ocean to deep-space search or surveillance, with special uses in crime patrols, anti-drug campaigns, rescue missions, oil and mineral exploration, fisheries, quality control, medical screening, military strategy, etc. There are six papers in this volume: 1. Search theory (Henry R. Richardson), 2. Optimal search for moving targets (Lawrence D. Stone), 3. Continuous search games (Shmuel Gal); 4. A differential equations approach (Marc Mangel); 5. Search plans generated by billiards (by the editors); 6. Uniform ergodic search on a disk (S. P. Lalley and Herbert E. Robbins).

A Concrete Approach to Mathematical Modelling. By Michael Mesterton-Gibbons. Addison-Wesley Advanced Book Program, 1989. xi+597 pp., $48.50.

The twelve chapters in this text, designed for a senior level course but also for self-study, are grouped into five parts: 1. The deterministic view; 2. Validating a model; 3. The probabilistic view; 4. The art of application; 5. Toward more advanced models. The models are based on the scientific literature and the book is substantially original. It emphasizes both the validation of scientific models and the rationale behind improving them. The approach is heuristic, but systematic, and embodies the author's belief that the three most fundamental ideas in mathematical modelling are transience (as in growth and decay, dynamical systems, birth and death), permanence (as in equilibrium, stationary distributions) and optimality (as in optimal control and utility, optimal decision and reward).

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A Primer of Diffusion Problems. By Richard Ghez. John Wiley and Sons, 1988. 256 pages. $26.95.

The literature on diffusion contains at least four different points of view: as a mathematical topic in partial differential equations, as a physico-chemical topic in non-equilibrium thermodynamics, as an engineering topic in materials science, and as a topic in stochastic processes. They all derive from the basic principle that something is conserved or can be balanced. This book seeks to bridge the gap between physico-chemical statements of certain kinetic processes and their reduction to diffusion problems, and to introduce the reader to analytic and numerical attacks on the diffusion equation. It is based on an interconnected set of problems, based on physically significant examples taken mainly from the author's experience in the areas of metallurgy and of semiconductor technology. Prerequisites are a serious year of calculus, through ode's and one semester of thermodynamics. Chapter headings: 1. The diffusion equation; 2. Steady-state examples; 3. Diffusion under external forces; 4. Simple time-dependent examples; 5. An introduction to similarity; 6. A user's guide to the Laplace transform; 7. Further time-dependent examples.

Numerical Continuation Methods—An Introduction. By Eugene L. Allgower and Kurt Georg. Springer-Verlag, 1990. xiv + 388 pages. $69.00.

This is volume 13 in the Springer Series in Computational Mathematics. It endeavours to provide an easy access for researchers and students to two new techniques that have yielded important contributions toward the numerical solution of nonlinear systems of equations: the predictor-corrector or pseudo arc-length continuation method, and the simplicial or piecewise linear method. The first has its historical roots in the incremental loading methods, and the second in the Lemke-Howson algorithm for solving nonlinear complementarity problems. The authors show that these two methods have many common features and are based on similar general principles, and are thus referred to as PC and PL continuation methods, respectively. The aim of the book is to present the basic aspects of these two rather general numerical techniques and to study their properties. Pseudo codes using a PASCAL syntax are used in presenting formulations for algorithms. Chapter headings: 1. Introduction; 2. Basic principles; 3. Newton's method as corrector; 4. Solving the linear systems; 5. Convergence of Euler-Newton-like methods; 6. Steplength adaptations for the predictor; 7. Predictor-corrector methods using updating; 8. Detection of bifurcation points along a curve; 9. Calculating special points of the solution curve; 10. Large scale problems; 11. Numerically implementable existence proofs; 12. PL continuation methods; 13. PL homotopy algorithms; 14. General PL algorithms on PL manifolds; 15. Approximating implicitly defined manifolds; 16. Update methods and their numerical stability.

Galois Theory, Second Edition. By Ian Stewart. Chapman and Hall, 1990. xxx + 202 pages. (cloth) $52.50, (paper) $22.50.

This is the second edition of the monograph first published in 1972. The main changes in this edition are the addition of an introductory overview and a chapter on the calculation of Galois groups.

Insight into Relativity. By Marvin G. Moore. Carlton Press Inc., New York, 1988. 137 pages.

This book aims to promote understanding of the basic ideas of relativity, keeping the needed mathematical background to algebra for the special theory, and to partial derivatives for the general theory.

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Chebyshev Polynomials: From Approximation Theory to Algebra and Number Theory, Second Edition. By Theodore J. Rivlin. John Wiley and Sons, 1990. xii + 249 pages. $49.95.

This is a revised and expanded edition of a volume in the series Pure and Applied Mathematics, first published in 1974. New material, amounting to about a third of the first edition, has been added. About 80 exercises have also been added. A new chapter introducing some elementary algebraic and number theoretic properties of the Chebyshev polynomials has been appended. The book continues to have two aims: (1) To give a survey of the most important properties of the Chebyshev polynomials, and (2) to introduce some interesting areas of mathematical analysis: interpolation theory, orthogonal polynomials, approximation theory, numerical integration, numerical analysis, ergodic theory, by the example of Chebyshev polynomials. Chapter headings: 1. Definitions and some elementary properties; 2. Extremal properties; 3. Expansion of functions in series of Chebyshev polynomials; 4. Iterative properties and some remarks about the graphs of the T_n; 5. Some algebraic and number theoretic properties of the Chebyshev polynomials.

Oil and Gas Forecasting—Reflections of a Petroleum Geologist. By Lawrence J. Drew. Oxford University Press, 1990. 252 pages. $45.00.

This is volume 2 in the series Studies in Mathematical Geology, International Association for Mathematical Geology. The author's purpose in writing this book is "to relate the events and expose the human drama that unfolded as advances were made in the field of petroleum geology". It is thus a delightful mixture of history, autobiography, and technical discussion of petroleum resource assessment methodology. In a narrow sense, the technical part is about forecasting oil and gas discovery rates and the associated task of determining the distributional form of oil and gas field size distributions.

Introduction to Partial Differential Equations from Fourier Series to Boundary-value Problems. By Arne Broman. Dover Publications Inc., 1989. iv + 183 pages. $5.95.

This is an unabridged, corrected republication of the work originally published in 1970 by Addison-Wesley Publishing Company. A feature of the book are the 260 carefully chosen exercises with answers, some routine and some challenging.

Two Phase Flows and Waves. Edited by Daniel D. Joseph and David G. Schaeffer. Springer-Verlag, 1990. x + 164 pages. $25.00.

This is volume 26 of the IMA Volumes in Mathematics and its Applications. It is based on the proceedings of a workshop held at the Institute of Mathematics and its Applications at the University of Minnesota from January 3–10, 1989. The workshop focused on the properties of materials which consist of many small solid particles or grains. Some papers deal with granular materials (consisting of solid particles interacting through direct contact with each other) and others with suspensions or two-phase flows (the grains interacting with each other through the influence of a viscous fluid). Regarding two-phase flow, three papers study the fundamental problems of deriving constitutive behavior theoretically, one analyzes the stability of various models for two phase flow, and another analyzes such a model in detail. Two papers concern the important application of fluidized beds. Regarding granular flow, one paper reports on experiments. Two papers study mathematical properties of equations describing granular flow with an assumed constitutive law, and another presents the results of the numerical solutions of such equations.

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Toward a Formal Science of Economics—The Axiomatic Method in Economics and Econometrics. By Bernt P. Stigum. The MIT Press, 1990. xiv + 1033 pages. $45.00.

This monograph is an essay in the philosophy of science, in which the author develops a formal unitary methodological basis for the theoretical and empirical sides of science. The basis is built up from fundamental theorems in logic and model theory and applied to the analysis of interesting theoretical and empirical problems in economics. The author's main purpose in writing the essay was to create a formal theoretical structure that would provide applied workers with guidance in methodological reasoning and with means to check the adequacy of statistical arguments. He also wanted to contribute to an orderly development of science by delineating efficient ways in which theorists, statisticians, and applied workers of any science could communicate. He feels he has succeeded, at least as far as the science of economics is concerned. The 34 chapters are divided into nine parts, the last three applying the methodological tools previously developed to various topics in economics and econometrics, including empirical analyses of the permanent-income hypothesis and consumer choice among risky and nonrisky assets; discussion of determinism, uncertainty, and the utility hypothesis; and studies of topics important to the analysis of economic time series. The nine parts are entitled: 1. Mathematical logic I: First-order languages; 2. Mathematical logic II: Theories and models; 3. Economic theory I: Consumer choice; 4. Probability theory: Chance, ignorance and choice; 5. Nonstandard analysis; 6. Epistemology; 7. Econometrics I: Empirical analysis of economic theories; 8. Economic theory II: Determinism, uncertainty, and the utility hypothesis; 9. Econometrics II: Prediction, distributed lags, and stochastic difference equations.

Theory of Distributions—A Non-Technical Introduction. By Ian Richards and Heekyung Youn. Cambridge University Press, 1990. ix + 147 pages. $39.00.

This book is addressed to non-specialists, somewhat in the spirit of Sir James Lighthill's famous book *Fourier Analysis and Generalized Functions*, where, however, a non-standard definition of 'distribution' is used. The authors have taken great pains to motivate the developments and to make the proofs clear and easy. Chapter headings: 1. Introduction; 2. The elements of distribution theory; 3. Examples of distributions; 4. Fourier transforms; 5. Tempered distributions; 6. Extension to higher dimensions; 7. A general definition of multiplication and convolution for distributions.

Islands of Truth—A Mathematical Mystery Cruise. By Ivars Peterson. W. H. Freeman and Company, 1991. 336 pages, 119 illustrations. $19.95.

The author's goal in this book is to share some of the mathematical mysteries now at the frontiers of research. Much of its material has appeared in a somewhat different form in *Science News* over the last eight years. Amongst many other topics, the author discusses: the interactions of computation, science (particularly physics) and mathematics; the transformation theory of mathematical shape leading to new forms of computer-generated art and architecture; modeling mountains and clouds with the use of fractals; the application of number theory in computer science and in acoustics.

Topology. By John G. Hocking and Gail S. Young. Dover Publications, 1988. ix + 374 pages. $7.95.

This is an unabridged and corrected republication of the work first published by Addison-Wesley Publishing Company in 1961. It is a text for a one-year first course in topology.

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Advances in Statistical Methods for Genetic Improvement of Livestock. Edited by D. Gianola and K. Hammond. Springer-Verlag, 1990. xx + 534 pages. $79.00.

This is volume 18 in the Advanced Series in Agricultural Sciences. It grew out of an international symposium which took place in Armidale, Australia, February 16–20, 1987. This 23-chapter volume is organized into seven main sections: 1. General; 2. Design of experiments and breeding programs; 3. Estimation of genetic parameters; 4. Prediction and estimation of genetic merit; 5. Prediction and estimation in non-linear models; 6. Selection and nonrandom mating; and 7. Statistics and new genetic technology. Each of the sections contains three or four main chapters plus a summary written by the corresponding moderator. Many of the papers are of considerable statistical sophistication and are of interest quite apart from their intended application field.

Fourier Series, Transforms, and Boundary Value Problems, Second Edition. By J. Ray Hanna and John H. Rowland. John Wiley and Sons, 1990. xii + 354 pages. $54.95.

The primary changes from the first, 1982, edition consist of the addition of new material on integral transforms, discrete and fast Fourier transforms, series solutions, harmonic analysis, spherical harmonics, and numerical techniques for the solution of boundary value problems. The text remains an introduction to Fourier and transform methods for the solution of boundary value problems associated with natural phenomena, placing the emphasis upon basic concepts and techniques rather than the development of theory.

Soliton Theory—A Survey of Results. Edited by Allan P. Fordy. St. Martin's Press, New York, 1990. 449 pages. $130.00.

This is a volume in the series Nonlinear Science and Applications. It reviews the most important topics of current research interest and provides a coherent introduction to the full range of soliton theory and developments. It consists of sixteen chapters by various authors, divided into six parts, as follows: 1. Introduction (a brief synopsis of soliton theory by the editor); 2. Solution methods (spectral transforms, Hirohita's method, Bäcklund transformations); 3. Physical applications (the peculiar wave patterns of the Andaman Sea, general relativity, atmospheric phenomena and Davydov solitons); 4. Hamiltonian theory (analytical mechanics, nonlinear evolution equations); 5. Algebraic and geometrical structures (Lie algebras and symmetric spaces, Kac-Moody algebras); 6. Testing for complete integrability (the Painlevé method and symmetries, conservation laws).

The Craft of Prolog. By Richard A. O'Keefe. The MIT Press, 1990. xix + 387 pages. $34.50.

This is a volume in the series Logic Programming. It is not an introductory Prolog book but may be thought of as "second steps in Prolog"—it is addressed to readers who have taken a course in Prolog, have written one or two Prolog programs and would like to improve their skill in writing programs that work and that don't take an unreasonable amount of time. Chapter headings: 1. Basic topics in Prolog; 2. Searching; 3. Where does space go?; 4. Methods of programming; 5. Data structure design; 6. Sequences; 7. Writing interpreters; 8. Some notes on grammar rules; 9. Prolog macros; 10. Writing tokenisers in Prolog; 11. All solutions.

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Topology: An Introduction with Application to Topological Groups. By George McCarty. Dover Publications, 1988. 288 pages. $6.95.

This is an unabridged and slightly corrected republication of the work first published by McGraw-Hill Company in 1967. It is an introduction to that part of point set topology which has become a prerequisite to most graduate programs in mathematics.

Linear Algebra. By Walter Nef. Dover Publications, 1988. 305 pages. $7.95.

This is an unabridged and corrected republication of the English translation (by J. C. Ault), first published by McGraw-Hill Company, of *Lehrbuch der Linearen Algebra*, first published by Birkhäuser, Basel, in 1966. It is based on an introductory course often given at the University of Berne.

Matrix and Operator Extensions. By H. J. Woerdeman. Stichting Mathematisch Centrum, P. O. Box 4079, 1009 AB Amsterdam, The Netherlands, 1989. 158 pages. Dfl. 48.00.

This is CWI Tract 68. It concerns extension problems for linear operators. The five chapters are entitled: 1. Block matrices: a sequential approach; 2. The band method; 3. The band method: applications; 4. Matrices; 5. Triangular operators.

Boundary Value Problems. By F. D. Gakhov. Dover Publications, 1990. xvi + 561 pages. $12.95.

This is an unabridged and unaltered republication of the work first published by Pergamon Press in 1966. It is a translation, edited by Professor Ian Sneddon of the University of Glasgow, of the second revised and enlarged Russian edition published in 1963 by Fizmatgiz, Moscow. The 54 chapters are divided into seven parts, as follows: 1. Integrals of the Cauchy type; 2. Riemann boundary value problems; 3. Singular integral equations with Cauchy kernel; 4. Hilbert boundary value problem and singular integral equations with Hilbert kernel; 5. Various generalized boundary value problems; 6. Boundary value problems and singular integral equations with discontinuous coefficients and open contours; 7. Integral equations soluble in closed form.

Mathematical Methods of Operations Research. By Thomas L. Saaty. Dover Publications, Inc., 1988. ix + 460 pages. $12.95.

This is an unabridged, enlarged republication of the classic work first published by McGraw-Hill Book Company in 1959. For this edition, the author added a preface entitled "A Generation Later" and a new chapter "Multicriteria decision making: the analytic hierarchy process". In the other chapters, the author discusses the nature of the scientific method, and covers aspects of optimization, linear and quadratic programming, game theory, probability, statistics, and queueing theory, there is also an essay "Some thoughts on creativity".

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Computers in Geometry and Topology. Edited by Martin C. Tangora. Marcel Dekker, Inc. 1989. vi + 317 pages.

This book contains fourteen essays by different authors showing the extraordinary variety of ways in which the computer can help to solve old problems, to reformulate old problems or redirect energy and interest, and to pose new problems, in both old fields and new. The topics include: homotopy groups (Anick), Hopf mappings (Banchoff), environments (representations of algebraic structures within a program; Benson), ext modules (Bruner), EHP computations (Curtis & Mahowald), theorem proving (Donald M. Davis), local symmetry (Giblin), Mandelbrot sets (Handler, Kauffman & Sandin), stable decompositions (John C. Harris), cohomology of groups (Lambe), Mandelbrot sets (John Milnor), homotopy groups of spheres (Revenel), computer language for topologists (Rector), Knot theory (Riley).

Geometry and Symmetry. By Paul B. Yale. Dover Publications, 1988. xi + 288 pages. $7.95.

This is an unabridged and corrected republication of the work first published by Holden-Day in 1968. A new preface has been written specially for this edition by the author. The book is an introduction to the geometry of Euclidean, affine, and projective spaces with special emphasis on the important groups of symmetries of these spaces. The two main objectives of the text are to introduce the main ideas of affine and projective spaces and to develop facility in handling transformations and groups of transformations, concentrating on the n-dimensional ($n \geq 3$) cases.

Essential Calculus with Applications. By Richard A. Silverman. Dover Publications, 1989. vii + 292 pages. $8.95.

This is a corrected, slightly enlarged republication of the work first published by the W. B. Saunders Company in 1977. The section "Supplementary hints and answers", originally issued in a separate instructor's manual, has been added to this edition by the author, who has also corrected a number of errors.

Advanced Calculus, Second Edition. By David V. Widder. Dover Publications, 1989. xvi + 520 pages. $10.95.

This is an unabridged and corrected republication of the ninth (corrected) printing of the second (1961) edition of the work originally published by Prentice-Hall in 1947. It is designed for students who have had a course in elementary calculus covering the work of three or four semesters.

Hilbert Space Methods in Science and Engineering. By László Máté. Adam Hilger, Bristol and New York, 1990. viii + 272 pages. $55.00.

The object of this book is to present Hilbert space theory as a useful language for applied mathematics and to present the basic facts and methods in a form suitable for mathematically inclined engineers and scientists. Therefore, the text also contains many examples of Hilbert space theory, the applications mainly revolving around reproducing kernel Hilbert spaces and causal operators. The author has attempted to make the book reasonably self-contained, avoiding as far as possible—though inevitably not always—the concepts of measurable functions and Lebesgue integration. Chapter headings: 1. Fundamentals; 2. The geometry of Hilbert spaces; 3. Reproducing kernel Hilbert spaces; 4. Operator theory; 5. Causal operators.