Bibliographie

R. Azencott—Y. Guivarc'h—R. F. Gundy, Ecole d'Eté de Probabilités de Saint-Fluor (VIII—1978, P. L. Hennequin). Ed. (Lecture Notes in Mathematics, 774), XIII+334 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980.

The volume containes three long survey articles. Azencott describes the recent flourishment of large deviation theory and its applications rather thoroughly, save the definitive paper by Groeneboom, Oosterhoff and Ruymgaart [*Ann. Probability,* 7 (1979), 553—586]. Guivarc'h investigates some asymptotic properties of random matrices excluding limit distribution results. Finally, Gundy overviews martingale inequalities (also for doubly indiced sequences) and the beautiful results on the intimate connection with H^p spaces.

Sándor Csörgő (Szeged)

L. W. Beineke and R. J. Wilson, Selected Topics in Graph Theory, XII+451 pages, Academic Press, London—New York—San Francisco 1978.

The literature of graph theory has grown at an enormous speed in the fast 10 years both in research papers and textbooks. Accordingly, there are many textbooks treating the basic results; these, however, have to remain on the surface and cannot go into the discussion of the recent result. There are some research monographs around, but these cover very small portion of the field. Many people who already know the basics would like to have an overview of what is going on in graph theory, what are the most important new results, what are the topics currently attracting the most interest, and what are the most exciting unsolved problems. The book reviewed here answers such questions. It is a collection of surveys wrote by outstanding researchers in the field. The advantage over, say, a conference proceedings with survey papers is that the topics are carefully chosen and the style, notation and terminology of the essays are unified by the editors. It contains 14 surveys (A. T. White—L. W. Beineke: Topological graph theory, A. T. White: The proof of the Heawood conjecture, D. R. Woodall—R. J. Wilson: The Appel-Haken proof of the Four-Color Theorem, S. Fiorini—R. J. Wilson: Edge colorings of graphs, J. C. Bermond: Hamiltonian graphs, K. B. Reid—L. W. Beineke: Tournaments, C. St. J. A. Nash—Willams: The reconstruction problem, D. R. Woodall: Minimax theorems in graph theory, R. L. Hemminger and L. W. Beineke: Line graphs and line digraphs, P. J. Cameron: Strongly regular graphs, T. D. Parsons: Ramsey graph theory, E. M. Palmer: The enumeration of graphs, R. C. Reid: Some applications of computers in graph theory).

It is natural that no such selection can cover all topics which are currently in the main stream of research, and there would be as many different selections as researchers. But certainly these essays give a very good insight into those trends which they treat and some of them in fact yield new and exciting points of view. Hopefully further topics will be covered by a continuation of this volume and this standard will be maintained.

László Lovász (Szeged)

D. van Dalen, Logic and Structures, VII+172 pages, Springer-Verlag, Berlin, Heidelberg, New York, 1980.

"This book provides an efficient introduction to logic for students of mathematics". It does really so.

Chapter 1 is devoted to propositional logic. The notions and basic properties of logical connectives etc. are established heuristically and only then the rigorous development follows. This method makes it easier to understand the aims of the theory for beginners. The material is arranged in a way similar to that used in the second part at predicate logic and this is a great help when reading the second part of the book. Both semantics and formal deductions (Gentzen's System) as well as the bridge between them: the Completeness Theorem are treated. Unfortunately the formal proofs are not easy to read and this might spoil one's interest in the subject. This is, however, by the nature of formal logic and not the fault of the book; also, the author often leaves the formal proofs to the reader.

The second chapter develops the basic facts about languages and structures, and illustrates the results through examples. It carefully points out those delicate steps (e. g. the use of "=" in the given language and in the meta-language) which usually cause problems for the beginners. Here, also, it is a hard work to follow the formal proofs.

In the last part of the book the author proves the completeness theorem (using Henkin constants) together with many of its consequences: compactness theorem, Skolem-Löwenheim theorems, axiomatizability, etc. and continues with the elements of model theory (elementary substructures, diagram language, Skolem functions). The results are also illustrated by such examples as the non-standard models of arithmetic and of the reals or a non-standard proof of König's lemma.

Finally a very brief description is given about second order logic.

The book contains a number of easier or harder exercises which help to practice and master the material.

V. Totik (Szeged)

M. Denker and K. Jacobs, Eds., Ergodic Theory, Proceedings, Oberwolfach, Germany 1978 (Lecture Notes in Mathematics, 729), XII+209 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1979.

The twenty-one research papers of this collection, read at an Oberwolfach conference, June 11—17, 1978, present new results in many directions (ergodicity categories, topological dynamics, L_p spaces, measure preserving homeomorphisms, reparametrization, normalizer groups, partitions and Rochlin sets, maximal and invariant measures, topological entropy, weak-mixing Markov operator semi-groups, ergodic group automorphisms, skew products, balancing averages, code lengths, the Lorentz attractor). All these topics still seem to belong to one branch of mathematics, namely to ergodic theory. The volume is dedicated to the memory of Rufus Bowen.

Sándor Csörgő (Szeged)

A. Dold and B. Eckham, Combinatorial Mathematics, Proceedings, Armidale, Australia, 1978. (Lecture Notes in Mathematics 748) IX+206 pp. Springer-Verlag, Berlin—Heidelberg—New York, 1979.

The book contains 18 papers delivered at the Sixth Australian Conference on Combinatorial Mathematics, representing mainly the fast developing Australian School of combinatorics. The three invited survey papers included in the volume are: R. B. Eggleton—D. A. Holton: Graphic sequences; Sheila Oakes Macdonald: Combinatorics — a branch of group theory? and B. D. McKay—R. G. Stanton: The current status of the generalized Moore graph problem.

L. Lovász (Szeged)

Th. Gasser and M. Rosenblatt, Eds., Smoothing Techniques for Curve Estimation, Proceedings, Heidelberg 1979 (Lecture Notes in Mathematics, 757), 245 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1979.

One of the basic problems of theoretical and applied statistics is: how to smooth the data to form an estimator (a sequence of stochastic processes) for the theoretical curve (distribution, quantile, or denisty function, or the derivatives of the latter, the regression function), or some functional of it (mode, multiple regression, etc.) to be estimated? The twelve research or survey papers of this collection, presented at a Heidelberg Workshop, April 2—4, 1979, offer a variety of such techniques for nonparametric curve estimation. Most of the papers deal with asymptotic properties of kernel, nearest neighbor, least squares, spline-function, quantile and M-estimators, and of robust and Tukey smoothers.

Sándor Csörgő (Szeged)

George Grätzer, General Lattice Theory (Lehrbücher und Monographien aus dem Gebiete der exacten Wissenchaften, mathematische Reihe, Band 52), XIII+381 pages, Birkhäuser Verlag, Basel und Stuttgart, 1978.

This is a basic monograph on lattice theory, which may serve as a textbook of the subject as well as a reference book for researchers working in the area. We have every reason to predict that this book will play the same fundamental role in lattice theory that the same author's "Universal Algebra" has played for a decade now in the theory of general algebraic systems.

The author's view is that in the seventies it is impossible to cover all of lattice theory in a book, thus he omits a great deal (ordered algebraic systems being one example), discusses only the basics, but the discussion goes into considerable depth. To carry out even such a project is a very difficult task at an age when the development is so rapid that no year passes without a remarkable breakthrough in one or another branch of lattice theory. Such areas as the theory of transferability, which is one of the author's major research interests, and the theory of pseudocomplemented distributive lattices, a topic thoroughly dealt with in Grätzer's earlier book "Lattice Theory: First Concepts and Distributive Lattices" (later on referred to as FC) have to be omitted or only briefly mentioned in order to reduce the material and to keep the size of the book within reasonable limits. But the result makes up for these sacrifices: the remaining material reflectes all what is dealt with in present day's lattice theory and the depth of the treatise makes the book an excellent course to bring the student from the very beginning to a point where he can start researches on his own.

The author breaks with the conception of building up lattice theory proceeding from partially ordered sets through lattices and modular lattices to distributive lattices. Distributive lattices are treated as a first priority in the book. This is justified by historical reasons (lattice theory started with distributive lattices) as well as by the fact that in the applications disrtibutive lattices play the most essential part. This approach has the additional advantages that, later on in the book, distributive lattices can serve as a model for all of lattice theory and the reader can reach deep results early. After an introductory chapter (Chapter I. First Concepts), where, among other things, free lattices, partial lattices, and finitely presented lattices are considered, Chapter II. deals with distributive lattices. These two chapters reproduce most of the material of FC, thus the book is not the companion volume of FC that was announced there, but a self-contained work.

Some highlights of the book: Chapter III. Among other things, Grätzer's and Schmidt's characterization of lattices with Boolean congruence lattice is presented. Chapter IV. A thorough discussion of type 2 and type 3 representability and an account on Jónsson's Arguesian equation is given. Chapter V. contains Baker's method of constructing equational bases, Herrmann's proof of McKenzie's finite basis theorem, the equational characterization of the variety M_3 and a discussion of the Amalgamation Property. Chapter VI. describes the structure of free lattices, $\mathscr{C}$-reduced free products, and gives a proof of Dilworth's famous theorem on the embeddability of a lattice into a uniquely complemented one. To present all these results and so many more in a book of this size needed substantial simplifications of the original proofs. Reading the book, one has the feeling that the proofs presented are the simplest possible.

The reader of this review might be interested in the table of contents: I. First Concepts: Two Definitions of Lattices; How to Describe Lattices; Some Algebraic Concepts; Polynomials, Identities, and Inequalities; Free Lattices; Special Elements. II. Distributive Lattices: Characterization Theorems and Representation Theorems; Polynomials and Freeness; Congruence Relations; Boolean Algebras R-generated by a Distributive Lattice; Topological Representations; Distributive Lattices with Pseudocomplementation. III. Congruences and Ideals: Weak Projectivity and Congruences; Distributive, Standard, and Neutral Elements; Distributive, Standard, and Neutral Ideals; Structure Theorems. IV. Modular and Semimodular Lattices: Modular Lattices; Semimodular Lattices; Geometric Lattices; Partition Lattices; Complemented Modular Lattices. V. Equational Classes of Lattices: Characterizations of Equational Classes; The Lattice of Equational Classes of Lattices; Finding Equational Bases; The Amalgamation Property. VI. Free Products: Free Products of Lattices; The Structure of Free Lattices; Reduced Free Products; Hopfian Lattices. Concluding Remarks. Bibliography. Table of Notation. Index

Each chapter is completed by a section "Further Topics and References", which is designed to bring the reader up-to-date in the most recent development. There is also a list of unsolved problems. The bibliography consists of more than 700 items. The short "Concluding Remarks" refer to some of the most important papers in the congruence representation theory and in the theory of transferability. It also contains hints to some relevant books and papers on the theory of Riesz spaces (vector lattices) and on orthomodular lattices. This part reflects the connections of lattice theory with analysis and physics.

Anybody doing research in or close to lattice theory is advised to read this book.

A. P. Huhn (Szeged)

C. C. Heyde—E. Seneta, I. J. Bienaymé. Statistical Theory Anticipated (Studies in the History of Mathematics and Phisical Sciences, 3), XIV+172 pages, Springer-Verlag, New York—Heidelberg—Berlin, 1977.

Most of us knew of Bienaymé only that has found the Chebyshev inequality some time (14 years, as it happens) before Chebyshev. The discovery of Heyde and Seneta [*Biometrika*, 59 (1972), 406—409] that he knew the key critacality theorem for the simple ("Galton-Watson") branching process in a correct form anticipating Galton and Watson by some 28 years (and the first formerly known correct statement of it by 85 years) has already suggested that there was much more in the man. Now here is a most enjoyable account on his scientific activities and life, and we can see a great, almost entirely forgotten probabilist and statistician of the 19th century in his full richness. The chapter headings (Hisorical background; Demography and social sciences; Homogeneity and stability of statiscical trials; Linear least squares; Other probability and statistics; Miscellaneous writings) can indicate his wide scope, and reading this excellent book justifies its title. But there is more in this monograph. As the authors write "the evolution of probability and statistics is fairly well documented up to the time of Laplace, and the developments of the twentieth century are widely appreciated. The intervening period of the last three quarters of the nineteenth century is the least well-understood period in the history of the subject". No doubt, this widely documented book clears up the mystery a great deal.

Sándor Csörgő (Szeged)

H. Heyer, Ed., Probability Measures on Groups, Proceedings, Oberwolfach, Germany 1978. (Lecture Notes in Mathematics, 706), XIII+348 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1979.

This is a collection of twenty-five research papers presented at an Oberwolfach conference January 29 — February 4, 1978. The editor roughly classifies these papers as belonging to one of the following five main topics: 1. Infinite convolutions of probability measures on groups and semigroups; 2. Continuous semigroups; 3. Special classes of probability measures (infinitely divisible and stable measures on groups); 4. Random walks on groups and homogeneous spaces (potential theory, noncommutative renewal theory, local limit theorems); 5. Group representations and probability.

Sándor Csörgő (Szeged)

I. A. Ibragimov—Y. A. Rozanov, Gaussian Random Processes (Applications of Mathematics, 9) X+275 pages, Springer-Verlag, New York—Heidelberg—Berlin, 1978.

This monograph (a translation of the 1970 Russian original) provides detailed investigations into three quite narrow but otherwise important problems concerning Gaussian stationary processes. The first is the equivalence problem of determining the conditions for mutual absolute continuity of Gaussian stationary measures, and to obtain the corresponding densities. The second problem is to describe the classes of spectral measures corresponding to regular strong mixing stationary processes. For the Gaussian case the monograph offers the complete solution. These are the strongest parts of the book, being the standard reference in this respect. The third problem is the estimation of the unknown mean of a stationary Gaussian process. This part of the monograph has perhaps been superseded in the meantime.

Other important topics (e. g. sample path properties,) are not discussed, hence the title of the monograph sounds more general than justified by the content.

Sándor Csörgő (Szeged)

J. G. Kalbfleisch, Probability and Statistical Inference I, II (Universitext), 342, 316 pages, with 35 illustrations, Springer-Verlag, New York—Heidelberg—Berlin.

These two volumes constitute a well-compiled fair introductory textbook for beginners knowing only freshman calculus. The sixteen chapter headings (Introduction; Equi-probable outcomes; The calculus of probability; Discrete variates; Mean and variance; Continuous variates; Bivariate continuous distributions; Generating functions; Likelihood methods, Two-parameter likelihoods; Checking the model; Test of significance; Intervals from significance test, Inferences for normal distribution parameters; Fitting a straight line; Topics in statistical inference) describe the scope and contents. The author's emphasis is on "applications and logical principles rather than mathematical theory". The text is, consequently, full with elementary examples. Each chapter ends with "review problems", solutions to some of which are given at the end of both volumes. The style is clear and very British. (The present reviewer likes it.)

Sándor Csörgő (Szeged)

Sofya Kovalevskaya: A Russian Childhood (Translated and introduced by Beatrice Stillman), Springer-Verlag, New York, etc. 1978.

Sofya Kovalevskaya (1850—1891), the first female professor of mathematics (Stockholm University) and first female corresponding member of the Russian Academy of Sciences, was not only an outstanding mathematician but a highly gifted writer as well. Her memoir gives a vivid description of the country life of the family of Sofya's father (who, apparently, was a descendant of Matthias Corvinus, king of Hungary in the 15th century). Some chapters, especially the fourth, reach truly high aesthetic level. The last two chapters (the relation of the Kovalevskaya sisters to F. M. Dostoevsky) are of special interest.

Ms. Stillman contributed very much to the book by her notes as well. (However, according to p. 250, in the "Notes on the General Literatute", about items of what she calls the secondary literature, she does not seem to know about a popular Hungarian "Mädchenroman" on "Professor Sonya".)

András Recski (Budapest)

Kenneth A. Ross, Elementary Analysis: The Theory of Calculus, VI+264 pp., Springer-Verlag, New York, Heidelberg, Berlin 1980.

"Designed for students having no previous experience with rigorous proofs, this text on analysis can be used immediately following standard calculus courses". This book is an excellent bridge between elementary calculus and more advanced studies in real analysis.

Chapter I contains the properties of the natural numbers and ordered fields.

Chapter II is devoted to a thorough study of sequences and series. The material is arranged in a usual way, the only exception is perhaps the Bolzano—Weierstrass Theorem: this is derived directly from the completeness axiom without the "halving procedure". The author strives to use only the necessary concepts and probably this effort made him avoid the concept of a closed set (treats it only in the optional § 13). However, the notion "closed" is so important that it would be worth while to use it even in an elementary book.

In Chapters III and IV the basic properties of continuous functions and function series are discussed. Chapter IV may be considered also as a very brief introduction to function theory. The last two sections are devoted to differentiation and integration.

Some more advanced topics are also discussed in optional paragraphs, e.g. metric spaces, Weierstrass's Approximation Theorem, Riemann—Stieltjes integral, the latter in a remarkably elegant version.

Everywhere when a new property or new concept is introduced, these are illustrated by examples. This large number of examples make the book very valuable both for students and teachers. The above mentioned "new Riemann-Stieltjes integrability" will surely have a quick success among analysis lecturers. The book contains many elementary exercises — the presentation of some more advanced exercises might have still raised the value of the book.

We recommend it for students having some experience in calculus (the functions sin x, e^x etc. are assumed to be familiar) and especially for teachers or future teachers in secondary schools.

V. Totik (Szeged)

L. E. Sigler, Exercises in Set Theory, Springer-Verlag, New York, Heidelberg, Berlin, 1976. pp. 133. (First published in 1966.)

This is the second edition of a group of exercises planned to help undergraduate students in studying set theory. Almost all problems are on a routine level assuming knowledge of basic set theoretic definitions and theorems included at the beginning few paragraphs of each section and, besides, some elementary notions in algebra involving the concepts of monoid, semigroup, group, ring, vector space and algebra. The selection of the topics is in accord with the structure of the volume Naive Set Theory by P. Halmos: Elementary Concepts, Cartesian Product, Relations, Functions, Families, Functions Defined on Power Sets, Applications of Functions, The Natural Numbers, Order, The Axiom of Choice and Zorn's Lemma, Well Orderings, Transfinite Recursion and Similarity, Ordinals and Cardinals. The clearly written answers are presented at the end of the book.

P. Ecsedi—Tóth (Szeged)

D. R. Smart, Fixed Point Theorems, VIII+93 pp., Cambridge University Press, Cambridge, London, New York, New Rochelle, Melbourne, Sydney, 1980 (second edition).

This is the first paperback edition of an excellent book published in 1974. The aim of the book is to treat the classical fixed point theorems and to show a number of applications in analysis.

Thus, the author begins with Banach's contraction principle; after this he proves, with a minimal use of algebraic topology, Brouwer's theorem from which he deduces other fixed point results such as Schauder's, Rothe's, Krasnoselskii's etc. The elements of fixed point theory for families of mappings and for many-valued mappings, as well as some recent results (e.g. Bowder's theorem about the existence of fixed points of non-espansive mappings of the closed unit ball in a Hilbert space) are also treated.

The applications are to the existence of solutions of differential equations; to the existence of invariant means and implicit functions; to minimax theorems etc.

The book concludes with a brief outline of numerical invariants used in fixed point theory.

The author often leaves details to the reader, by which he is able to point out the key steps in the proofs. The book contains interesting exercises and unsolved problems; the status of the latter, however, might have been mentioned in the new edition.

We recommend this introductory work to everybody who wants to get acquainted with this useful and interesting part of mathematics and with its applications.

V. Totik (Szeged)

B. R. Tennison, Sheaf Theory (London Mathematical Society Lecture Note Series, 20), VII+164 pages, Cambridge University Press, 1975.

This is a very good introduction to some questions of sheaf theory. At present sheaf theory finds its main applications in topology and in algebraic geometry, where it has been used to solve several longstanding problems. This book gives a general definition of a manifold, incorporating both the geometric and topological special cases, and then applies sheaf cohomology to such objects. "The approach to the subject taken here is rather categorical, and the course may be used (as indeed has been) as an introduction to the usefulness of categories and functors." It presupposes only the knowledge of the elements of topology and abstract algebra on the part of the reader.

A. P. Huhn (Szeged)

Jacob Wolfowitz, Selected Papers, Edited by J. Kiefer with the assistance of U. Augustine and L. Weiss, XXIII+642 pages, Springer-Verlag, New York—Heidelberg—Berlin, 1980.

This beautiful book contains 49 papers of Professor Wolfowitz reprinted from the original journals, out of the 120 items of his bibliography published at the end of the volume. The volume appeared for the 70th birthday of the great statistician and information theorist. The editors admit that the selection of those papers that have been reprinted has been extremely difficult. "We have tried to choose the papers we regarded as most important among Wolfowitz's work in terms of their further influence, or sometimes a paper that contains what we found a striking idea of his." Following a photograph and a biographical note, the editors provide a highly clear introduction to the research works of Jacob Wolfowitz. Most of his papers (not only those reprinted) are described to some degree in this introduction.

Sándor Csörgő (Szeged)

Livres reçus par la rédaction

Analytic Functions, Proceedings of a Conference held in Kozubnik, Poland, April 19—25, 1979. Edited by L. Lawrinowicz (Lecture Notes in Mathematics, Vol. 798), 476 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 48,50.

Approximation Methods for Navier-Stokes Problems, Proceedings of the Symposium held by the International Union of Theoretical and Applied Mechanics (IUTAM) at the University of Paderborn, Germany, September 9—15, 1979. Edited by R. Rautmann (Lecture Notes in Mathematics, Vol. 771), XVI+581 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 58,—.

R. Azencott—Y. Guivarc'h—R. F. Gundy, Ecole d'Eté de Probabilités de Saint-Flour VIII, 1978. Edité par P. L. Hennequin (Lecture Notes in Mathematics, Vol. 774), XIII+334 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 34,50.

J. Bair—R. Fourneau, Etude géométrique des espaces vectoriels II. Polyèdres et polytopes convexes (Lecture Notes in Mathematics, Vol. 802), VII+283 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 29,—.

K. W. Bauer—S. Ruscheweyh, Differential operators for partial differential equations and function theoretic applications (Lecture Notes in Mathematics, Vol. 791), V+258 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 29,—.

Bifurcation and Nonlinear Eigenvalue Problems, Proceedings, Université de Paris XIII, Villetaneuse, France, October 2—4, 1978. Edited by C. Bardos, J. M. Lazry, M. Schatzman (Lecture Notes in Mathematics, Vol. 782), VIII+296 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 34,50.

Burnside Groups, Proceedings of a Workshop held at the University of Bielefeld, Germany, June-July 1977. Edited by J. L. Mennicke (Lecture Notes in Mathematics, Vol. 806), V+274 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 29,—.

P. J. Cameron—J. H. Van Lint, Graphs, codes and designs (London Mathematical Society Lecture Note Series, 43), VII+147 pages, Cambridge University Press, Cambridge—London—New York—Melbourne, 1980. — £ 8.25.

C. Constantinescu, Duality in measure theory (Lecture Notes in Mathematics, Vol. 796), IV+197 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 25,—.

W. Dicks, Groups, trees and projective modules (Lecture Notes in Mathematics, Vol. 790), IX+127 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 18,—.

A. Dinghas, Wertverteilung meromorpher Funktionen in ein- und mehrfach zusammengehängen Gebieten, herausgegeben von R. Nevanlinna und C. A. Cazacu (Lecture Notes in Mathematics, Vol. 783), XIII+145 Seiten, Springer-Verlag, Berlin—Heidelberg—New York, 1980. — DM 21,50.