Bibliographie

J. L. Bauer—G. Goos, Informatik, Teil I—II (Heidelberger Taschenbücher, Sammlung Informatik, Bd. 80—91), XII+213, XII+200 Seiten, Berlin—Heidelberg—New York, Springer Verlag, 1971.

Die stürmische Entwicklung der elektronischen Rechenanlagen in den letzten 15 Jahren hat an vielen Universitäten und Hochschulen die neue Studienrichtung Informatik (oder „computer science") zum Leben gerufen. Das vorliegende Buch ist aus den an der TU München gehaltenen Vorlesungen der Verfasser und anderer prominenter Persönlichkeiten der Informatik entstanden. Sein Ziel ist, wie auch der Untertitel betont, „eine einführende Übersicht" über diesen neuen Wissenschaftszweig, und seine Querverbindungen zu anderen Disziplinen zu schaffen.

Die Darstellung geht vom Allgemeinen zum Speziellen, primär ist die Programmierung und sekundär die Maschine. Diese „top-down" Aufbau möchte ungewöhnlich sein für diejenigen, die ihre Kenntnisse parallel mit der Entwicklung der Computerwissenschaft erworben haben, man muß aber bedenken, daß das Buch für eine andere Generation geschrieben wurde. Großer Vorteil des Buches ist, daß die Verfasser die mit der Darstellung formaler Sprachen oft verbundene Schwerfälligkeit vermeiden konnten, ohne die Exaktheit zu beeinträchtigen. Um außer einer einführenden Übersicht eine wirkliche Einführung in die Informatik zu bekommen, soll der Anfänger auch viele Übungsaufgaben lösen, selbstständig Programme schreiben. In das Buch sind keine Aufgaben aufgenommen, jedoch wird es in Aussicht gestellt, daß das entsprechende Übungmaterial in einem separaten Band derselben Reihe herausgegeben wird.

Die Ausstattung des Buches ist übersichtlich, die vielen Abbildungen und Programmbeispiele erhöhen wesentlich die Verständlichkeit.

Die Kapiteltitel sind: 1. Information und Nachricht; 2. Begriffliche Grundlagen der Programmierung; 3. Maschinenorientierte algorithmische Sprachen; 4. Schaltnetze und Schaltwerke; 5. Dynamische Speicherverteilung; 6. Hintergrundspeicher und Verkehr mit der Außenwelt, Grundprogramme; 7. Automaten und formale Sprachen; 8. Syntaktische und semantische Definition algorithmischer Sprachen. Anhänge über Datenendgeräte und Geschichte der Informatik vervollständigen das Buch.

D. Vermes (Szeged)

Sterling K. Berberian, Lectures in Functional Analysis and Operator Theory (Graduate Texts in Mathematics, Vol. 15), IX+345 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1974.

This book is a useful introduction to several chapters of Functional Analysis and Operator Theory, in which the author's personal style blends with the styles of such masters of exposition as Halmos, Kaplansky, and Bourbaki. It begins with an "apéritif": Gelfand's functional analytic proof of Wiener's theorem on the reciprocal of an absolutely convergent Fourier series. Chapters:

1. Topological Groups; 2. Topological Vector Spaces, 3. Convexity; 4. Normed Spaces, Banach Spaces, Hilbert Spaces; 5. Category; 6. Banach Algebras; 7. C^*-Algebras; 8. Miscellaneous Applications. Among these applications we find e.g. a formulation of the spectral theorem for normal operators, introduction to von Neumann algebras, group representations, the character group of an LCA group. (Spectral measure and spectral integral representation are nowhere mentioned.) There are many 'exercises' listed. A *10* page 'Hints, Notes, and References' and a Bibliography of *150* titles conclude the book.

Béla Sz.-Nagy (Szeged)

János Bognár, Indefinite Inner Product Spaces (Ergebnisse der Mathematik und ihrer Grenzgebiete, Band 78), IX+223 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1974. — DM. 48 —.

This book is an excellent foundation of the theory of indefinite inner product spaces, and gives a good starting point for studying special topics and applications of this area. Results of a number of authors are discussed in a clear, elegant manner.

The book consists of nine chapters preceeded by a short "Preface". In Chapter I the basic notions are introduced and analysed. In Chapter II linear operators are discussed in an indefinite inner product space without topology (among others: isometric and symmetric operators, plus-operators and Cayley transformations). In Chapter III and IV several topologies are introduced, their connections to each other and to the inner product are explained. Relations are studied between the topologies and the orthogonal companion, the existence of projections, etc. Chapter V deals with the geometry of Krein spaces (non-degenerate, decomposable, complete spaces). The main topic of Chapter VI is unitary and selfadjoint operators in Krein spaces, especially their continuity and the location of their spectra. In Chapter VII positive operators (especially plus-operators) are discussed in Krein spaces. Chapter IX is devoted to Pontrjagin spaces and their operators.

At the end of each chapter there are given Notes which contain partly historical and other comments related to the main text, partly a survey of the literature of advanced topics and applications not detailed in this book. A carefully prepared list of references is included.

The book is a complete introduction, contains all of the necessary definitions and gives full proofs. However, it is advantageous for the reader to be familiar with the basic facts of linear algebra, topology, and Hilbert and Banach space theory.

The material of the book is lucidly arranged and the exposition is clear. A great number of illustrating examples makes the understanding easier.

E. Durszt (Szeged)

5th Conference on Optimization Techniques, Part I—II (Lecture Notes in Computer Science 3—4), Edited by **R. Conti** and **A. Ruberti,** XIII+565, XIII+389 pages, Berlin—Heidelberg— New York, Springer-Verlag, 1973.

These Proceedings contain the papers presented at the Conference of the International Federation of Information Processing (IFIP) held in Rome, May 7—11, 1973. The authors' manuscripts are reproduced photographically.

The first part contains the papers of more theoretical nature from the following fields: System modelling and identification, distributed systems, game theory, pattern recognition, optimal control, stochastic control, mathematical programming, numerical methods. The second part is devoted to application areas as urban and society systems, computer and communication networks, environmental systems, economic models, biological systems.

The nearly 100 papers of authors from all parts of the globe cover most part of optimization theory and related areas, and give a good insight into the fields of recent research.

D. Vermes (Szeged)

John B. Conway, Functions of one complex variable (Graduate Text in Mathematics, Band 11), XI+313 pages, New York—Heidelberg—Berlin, Springer-Verlag, 1973.

This book is a good introduction to the theory of functions of one complex variable. It is intended as a textbook for students, familiar with elementary real analysis. In fact, the actual prerequisites for reading the book are quite minimal: mathematical maturity to understand and execute $\varepsilon-\delta$ arguments.

The text consists of twelve chapters. The first three chapters summarize the basic definitions and facts on the complex number system, metric spaces and the topology of the field of complex numbers, and elementary properties of analytic functions. Chapter 4 is devoted to complex integration, which is fundamental in the study of analytic functions. Chapter 5 contains the classification of singularities of functions that are analytic in a punctured disk. The next chapter starts with the maximum modulus theorem and presents various extensions and applications such as Hadamard's three circles theorem and the Phragmén-Lindelöf theorem. In Chapter 7 a metric is put on the set of all analytic functions on a fixed region, and compactness and convergence properties are discussed. Proofs of the Riemann mapping theorem and the Weierstrass factorization theorem are obtained as applications. Chapters 1 through 7 are basic and used repeatedly in the rest of the book.

The remaining chapters are independent topics and may be studied in any desired order. Chapter 8 presents Runge's theorem and, as a consequence, a more general form of Cauchy's theorem. A theorem of Mittag-Leffler on the existence of meromorphic functions with prescribed poles and singular parts is also proved. Chapter 9 studies the problem of analytic continuation and introduces the reader to the theory of analytic manifolds and covering spaces. Chapter 10 is devoted to the questions of harmonic functions, including a solution of the Dirichlet problem and the introduction of Green's functions. The subject of the last two chapters is a short outline of the theory of entire functions. Chapter 11 gives a complete proof of Hadamard's factorization theorem, while in Chapter 12 the great theorem of Picard is proved.

The author's guiding principle is that all definitions, theorems, etc. should be clearly and precisely stated. The proofs are given in detail, the connections are pointed out perfectly. Each section is followed by exercises, which help the reader understand the ideas presented, extend the theory or give applications to other parts of mathematics. The book is supplemented by an appendix on the calculus of complex valued functions defined on an interval.

F. Móricz (Szeged)

D. H. Fremlin, Topological Riesz Spaces and Measure Theory, XIV+266 pages, Cambridge University Press, 1974.

The development of the theory of Riesz spaces (vector lattices) was extremely fast (because of its connections with functional analysis), however a relatively long time passed until the publication of the first monographs on the theory. Both in theory and applications Luxemburg's and Zaanen's book can be regarded as the first monograph on the subject; in the field of further applications this was followed by Fremlin's book reviewed here. In the preface the author writes: "My aim ... is to identify those concepts in measure theory which have most affected functional analysis and to integrate them into the latter subject in a way consistent with its own structure and habits of thought". Since the principal Banach spaces which measure theory has contributed to functional analysis are all Riesz spaces in a natural way, and since many of their special properties can be derived from their (topological) Riesz space structure, the author presents the material within the framework of an abstract theory dealing with topological Riesz spaces.

Chapters 1 and 2 elaborate the basic concepts and results of the theory of topological Riesz spaces, in particular, of L- and M-spaces.

Chapters 3 to 5 are devoted to the study of dual spaces, Riesz spaces over Boolean rings and measure algebras, respectively. By using the results of the previous chapters, the last three chapters deal with measure theory and, among others, include the Radon—Nikodým theorem and the Riesz theorem concerning the integral representability of linear functionasl on spaces of continuous functions.

The elaboration of the book is rigorously exact.

A. P. Huhn (Szeged)

H. G. Garnir—M. de Wilde—F. Schmets, Analyse fonctionnelle. Théorie constructive des espaces linéaires à semi-normes. Tome I: Theorie générale, X+562 pages, 1968. **Tome II: Mesure et intégration dans l'espace euclidien,** 287 pages, 1972. (Lehrbücher und Monographien aus dem Gebiete der Exakten Wissenschaften, Mathematische Reihe, Bd. 36—37.) Basel—Stuttgart, Birkhäuser Verlag.

Le tome I expose la théorie générale des espaces linéaires à semi-normes ou espaces vectoriels topologiques localement convexes. L'intention des auteurs est ce que la lecture de l'ouvrage exige seulement une connaissance d'analyse élémentaire et ils réussissent à la réaliser par l'utilisation systématique des semi-normes et en évitant les moyens topologiques tant que possible. Les raisonnements sont constructifs, ils suivent l'épigraphe de l'Introduction: „Il faut attacher une bien autre importance aux exemples qui n'utilisent pas l'axiome de Zermelo qu'à ceux qui l'utilisent.“ D'autre part, l'ouvrage renferme tous les résultats importants de la théorie; quelques titres nous en convainquent: Limite inductive, produit, quotient; Prolongement des fonctionnelles linéaires bornées; Ensembles équibornés; Duaux particuliers; Espaces nucléaires; Fonctionnelles bilinéaires et produits tensoriels; Espaces d'opérateurs bornés; Théorie spectrale des opérateurs bornés.

Cependent, on peut douter que l'exclusion de la topologie soit justifiée. La topologie n'est pas une théorie étrange de nos jours. Beaucoup de notions et relations introduites dans le livre seraient simplement liées entre elles justement par la théorie de la topologie. D'autre part, il est déplorable que la définition des applications linéaires bornées resp. continues n'est pas celle qu'on emploit usuellement. Aussi, beaucoup de notations ne sont pas celles familières et on peut reprocher le manque d'un tableau de notations.

Il n'y a aucun exemple dans le tome I. Le tome III — à paraître — est prédestiné à servir des exemples, traitant de la théorie des espaces linéaires à semi-normes particulières et des espaces Hilbertiens.

Le tome II sert de base à l'étude des espaces de suites, de fonctions, de distributions, qui feront l'objet du tome III. La pluspart de ce volume est indépendente du tome I. Les mesures sont définies à priori sur les semi-intervalles dans un ouvert d'un espace euclidien et sont à valeurs complexes. Partant des fonctions étagées sur les semi-intervalles, on définit les fonctions intégrables et on démontre leurs propriétés essentielles par la méthode des suites de Cauchy. On passe ensuite à un traitement des fonctions et des ensembles boréliens. Un chapitre est consacré aux relations entre mesures et on considère aussi l'intégration de fonctions à valeurs dans un espace linéaire à semi-normes et des mesures à valeurs dans un espace linéaire à semi-normes.

T. Matolcsi (Szeged)

K. P. Hadeler, Mathematik für Biologen (Heidelberger Taschenbücher, Bd. 129), IX+232 Seiten, Berlin—Heidelberg—New York, Springer-Verlag, 1974.

Die heutigen biologischen Wissenschaften brauchen immer mehr mathematische Hilfsmittel, dementsprechend enthält dieses kleine Buch auch eine ausgebreitete mathematische Einführung. Neben dem systematischen Aufbau der Differential- und Integralrechnung und der linearen Algebra findet man mehrere Paragraphen über Differentialgleichungen und einige über Wahrscheinlichkeitsrechnung und mathematische Statistik.

Das Buch folgt eine moderne und exakte Terminologie; Sätze, deren Beweise tiefliegender sind, werden natürlich ohne Beweis mitgeteilt. Die interessantesten Teile sind aber die biologischen Anwendungen der mathematischen Hilfsmittel: Räuber—Beute-Modelle, Selektionsmodelle, ein Nervenmodell, die Entwicklung der Populationen, die Gleichgewichtszustände und ihre Stabilitätsfragen werden ausführlich diskutiert.

K. Tandori (Szeged)

P. R. Halmos,

Finite-Dimensional Vector Spaces (Undergraduate Texts in Mathematics), VIII+200 pages.
Naive Set Theory (Undergraduate Texts in Mathematics), VII+104 pages.
Lectures on Boolean Algebras, VII+147 pages.
Measure Theory (Graduate Texts in Mathematics, Vol. 18), XI+304 pages.
A Hilbert Space Problem Book (Graduate Texts in Mathematics, Vol. 19), XVII+365 pages.
New York—Heidelberg—Berlin, Springer-Verlag, 1974.

The books are new editions of the well-known earlier ones. Seven, eleven, sixteen, and twenty four years after their first editions the books kept to be modern, interesting and brilliant.

From a preface of the author: "The only way to learn mathematics is to do mathematics." "The right way to read mathematics is first to read the definitions of the concepts and the statements of the theorems and then, putting the book aside, to try discover the appropriate proofs." We can add that the right way to teach mathematics is to give such lectures and to write such books that the listeners or readers be able to understand easily the motivation of definitions and to grasp the core of the statements. The high popularity of Halmos' books proves that the author succeeded in teaching mathematics to his readers in the right way.

One of the greatest merits of Halmos' texts lies in their clear structure, simple draft, consequent and suggestive notations which set them up as a model for modern texts and monographs in mathematics.

T. Matolcsi (Szeged)

Ronald Larsen, An Introduction to the Theory of Multipliers (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 175), XX+282 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1971.

The concept of a multiplier first appears in attempts to describe those sequences $\{c_n\}$ for which $\Sigma c_n a_n e^{int}$ is a Fourier series whenever $\Sigma a_n e^{int}$ is such. Multipliers enjoy much past and recent attention. There are now several definitions of a multiplier and one can be meaningful while the other is not; however, in many important cases they are all meaningful and equivalent. It is not generally known if any two of them are equivalent, provided that they are meaningful. One possible definition (in the commutative case) is the following: Let G be a locally compact Abelian group and X, Y topological linear spaces of (equivalence classes of) functions or measures defined on G. Then a multiplier for the pair (X, Y) is any continuous linear mapping of X into Y which commutes with the operators that the group translations induce in X and Y. In many cases the functions or measures f considered have Fourier transforms $\hat{f}$ (on the dual group $\hat{G}$). In these cases, by another customany definition, a multiplier is a linear transformation T from X to Y such that $(Tf)\hat{} = \varphi \hat{f}$ for each $f \in X$ and some function φ on $\hat{G}$. Still another definition determines a multiplier for a commutative Banach algebra as a mapping T of the algebra under consideration into itself for which $T(xy) = x(Ty)$ holds for any elements x, y of the algebra. This definition is not as a rule meaningful or valid in all cases mentioned above; however, it can often be established for certain subsets of X and Y.

The book concentrates on the characterization problem of multipliers from the functional analytic point of view. Only the commutative version of the theory is presented; however, some non-commutative results are also treated and there are references to such results. The first chapter is a prologue, in which the multipliers for the pair $(L_1(G), L_1(G))$ are studied. Two subsequent chapters discuss multipliers of Banach algebras and commutative H^*-algebras. After this the book studies in five chapters the multipliers for the pairs (X, Y) where X and Y are the spaces $L_p(G)$ $(1 \leqq p \leqq \infty)$, the space $C_0(G)$ of all complex valued continuous functions which vanish at infinity, the dual space of $C_0(G)$ with the weak-star topology, the space of bounded regular complex valued Borel measures on G, the Banach algebras $A_p(G)$ of elements in $L_1(G)$ whose Fourier transforms belong to $L_p(\hat{G})$, and the Hardy spaces of compact connected Abelian groups with ordered duals. At the end of each chapter the author indicates some sources of the material developed in the chapter in question. Some applications of the theory of multipliers are also presented. A number of appendices facilitates the reading of the book.

J. Szűcs (Szeged)

Fonctions analytiques de plusieurs variables et analyse complexe (Série „Agora Mathematica“ dirigée par **P. Lelong,** vol. 1), VIII+272 pages, Gauthier-Villars, Paris, 1974.

Ce volume contient les exposés des communications faites au Colloque International du C. N. R. S., organisé sur l'initiative de P. Lelong à Paris, 14—20 juin 1972. Les 29 exposés, écrits par des spécialistes, recouvrent une grande partie des recherches actuelles dans le domaine d'Analyse complexe. Ils se dirigent en particulier vers les sujets suivants: a) Fonctions analytiques de n variables complexes; géométrie analytique; singularités. b) Analyse complexe, fonctions plurisousharmoniques et functions analytiques dans les espaces vectoriels topologiques. c) Problèmes de cohomologie à croissance et solutions constructives.

Béla Sz.-Nagy (Szeged)

J. and **R. Nevanlinna, Absolute Analysis** (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen mit besonderer Berücksichtigung der Anwendungsgebiete, Band 102), II+270 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1973.

This second edition is a translation of the authors' monograph which appeared in 1959 in German.

It presents a systematic account of an absolute, coordinate and dimension free infinitesimal vector calculus. The elimination of coordinates signifies a gain not only in a formal sense. It leads to a greater unity and simplicity in the theory of functions of arbitrarily many variables; the algebraic structure of analysis is clarified, the geometric aspects of linear algebra become more prominent, and these promote the formation of new ideas and methods.

The presentation is in general restricted to the finite dimensional case, i.e., to the theory of finitely many variables. At the same time it lies in the nature of the methods that they can be applied, either directly or with certain simple modifications, to the case of Hilbert or Banach spaces of infinitely many dimensions.

The book consists of six chapters, an index, and a short but effective bibliography. Chapter I contains the fundamentals of linear algebra and analytic geometry of finite dimensional spaces. The central problems of differential calculus are developed in Chapter II. Because of the great significance of the theory of implicit functions, two different methods for the inversion problem are presented. Chapter III is devoted to integral calculus and Chapter IV to the theory of differential equations. As an application of the preceding chapters, the basic features of the classical curve theory and of the Gaussian surface theory are presented in Chapter V. In this new edition, a survey of the elements of Riemannian geometry has been added in Chapter VI. This edition also differs at several other points from the first one. In particular, the theory of implicit functions in Chapters II and IV on differential equations have been substantially reworked and extended.

The presentation of the book is concise but always clear and well-readable. It can be recommended to everybody familiar with the usual, coordinate-based, structure of the elements of infinitesimal calculus. It seems that the absolute infinitesimal calculus can be advantageously used not only in mathematics, but also in theoretical physics.

F. Móricz (Szeged)

J. C. Oxtoby, Maß und Kategorie (Hochschultext), VII+111 Seiten, Berlin—Heidelberg—New York, Springer-Verlag, 1971.

Der Bairesche Kategorie-Satz erlaubt uns mathematische Objekte, die sonst schwer zu sehen wären, sichtbar zu machen, und er kann bei der Formulierung von Existenzsätzen besonders nützlich sein. Das Kategorie-Studium dient jedoch auch noch einem anderen Zweck, namentlich fügt es der Maßtheorie neue Perspektiven hinzu.

Das Buch behandelt hauptsächlich zwei Themenkreise: den Baireschen Kategorie-Satz als Hilfsmittel für Existenzbeweise, sowie die „Dualität" zwischen Maß und Kategorie. Es gibt auch eine kurze Einführung in die Grundlagen der Baireschen Kategorie-Theorie und in die grundlegenden Eigenschaften des Lebesgueschen Maßes. Außerdem werden einige Begriffe aus der metrischen und der allgemeinen Topologie eingeführt, um viele Beispiele für die Anwendung der Baireschen Kategorie-Methoden geben zu können.

Vom Leser werden lediglich grundlegende Kenntnisse aus der Analysis und eine gewisse Vertrautheit mit der Mengenlehre vorausgesetzt.

T. Matolcsi (Szeged)

G. Preuss, Allgemeine Topologie (Hochschultext), VIII+488 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1972.

This book is based on lectures held by the author at the University of Berlin during the summers 1970—71. It is intended as an introduction into set theoretical topology, without special prerequisites. Thus it is offered to anyone interested in topology and mature enough to understand abstract mathematical thinking.

The book consists of 11 Chapters. Chapter 0 presents the set theoretical background needed for the rest of the book. Chapter 1 introduces the notion of topological spaces (it gives several different mutually equivalent definitions), and then defines continuity. This chapter also deals with the category theoretical foundations of topology. Chapter 2 brings to the reader the modern theory of limit: it presents the fundamentals of filter convergence and ultrafilters. Chapter 3 deals with weakest and finest topologies and their category theoretical aspects. Chapter 4 is devoted to the systematic study of separation axioms. Chapter 5 studies the classical concept of connectedness and its generalizations. Chapter 6 is devoted to the study of the interplay between separation and connectedness. After this, in Chapter 7, an account is given of several concepts of compactness, and quasicompact and locally compact spaces are studied. This chapter ends with a quite detailed study of compactifications. Chapter 8 is devoted to some modern aspects of set theoretical topology. The reader can skip this chapter for the first reading of the book without disturbing the study of the remaining chapters. Chapter 9 summarizes the basic notions and results concerning uniform spaces. It also treats the problem of uniformibility and metrizability. The concluding chapter 10 is devoted to the study of proximity spaces.

The book ends with a rich collection of exercises, which help the reader understand the main text.

László Gehér (Szeged)

H. Rademacher, Topics in Analytic Number Theory (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen mit besonderer Berücksichtigung der Anwendungsgebiete, Band 169), IX+320 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1973.

At the time of Professor Rademacher's death in 1969, the manuscript of the present work was already completed. The editors had only to supply a few bibliographical references and to correct a few misprints and errors.

The text consists of four parts, divided into fifteen chapters. The book is supplemented with the editors' notes, a short but effective bibliography, and an index.

The first five chapters constitute Part I, which is devoted to the basic analytic tools employed, such as the Bernoulli polynomials and numbers, the Euler—MacLaurin sum formula, the Γ-function and Mellin's theory, the Phragmén—Lindelöf theorem, the Poisson sum formula, and various applications of these topics.

Part II deals with the special functions that are of fundamental importance in analytic number theory. Particular attention is paid to the Riemann ζ-function and to the connection between the prime-number theorem and the zeros of the ζ-function. The proof of the prime number theorem and the role that the location of the zeros of $\zeta(z)$ in the "critical strip" $0<\operatorname{Re}(z)<1$ plays in the whole theory of the distribution of prime numbers are treated in Chapters 6—7. The error term in the prime-number theorem is obtained with the aid of Dirichlet series. In Chapter 8 Eisenstein series and modular forms are considered. Chapter 9 introduces the notion of the Dedekind function $\eta(\tau)$ and the Dedekind sums, and proves the formula of reciprocity of the Dedekind sums. The close connection between the reciprocity formula for Dedekind sums and the Jacobi residue symbol is also indicated. In Chapter 10 the theory of ϑ-functions is developed, while Chapter 11 contains the main properties of elliptic functions and their applications to number theory.

The results of Part III are mainly based on the method of formal power series. This method compares the coefficients of two different expansions of the same function and interpretes them in an arithmetical way, where the question of convergence plays no role, since the arguments are purely formal and concern only formal power series. The formal power series themselves form a commutative ring with unit and without zero divisors, provided the coefficients are taken from a ring of the same type. In Chapter 12 the connection between formal power series and the theory of partitions is described. Chapter 13 is a detailed account of Ramanujan's congruences and identities. The proofs, following Ramanujan, are given by means of formal power series. Independently, Schur had rediscovered these identities and employed the important "Gaussian polynomials" in his proof. Schur's proof gives some deeper arithmetical insight into the structure of these formulae.

If one replaces the indeterminate by a complex variable z, the formal power series becomes a power series in the usual sense to which the concept of convergence applies. Convergent power series represent analytic functions and the formal identities become equations for analytic functions. This step opens the whole store of analytic tools for the treatment of arithmetical problems in additive number theory. Part IV contains the description of the analytic theory of partitions (Chapter 14) as well as the application of the circle method to modular forms of positive dimension (Chapter 15).

The book has been carefully and accurately written. The style is tight, with hardly a word wasted. There is a lack of motivation at some places, and some of the theorems are stated without background explanations.

The work contains a wealth of information in a concise and polished form, accurate from the viewpoint of rigorous analysis. It can be used as a textbook for students of graduate courses, but it is a useful reading also for mature mathematicians interested in analytic number theory.

F. Móricz (Szeged)

Leopold Schmetterer, Introduction to Mathematical Statistics (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 202), VII+502 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1974.

This is an English translation of the second German edition of the author's book "Einführung in die mathematische Statistik" published also by Springer-Verlag. Some changes had been made during the preparation of the translation: misprints hade been corrected, proofs had been altered, new results had been included and the bibliography had been supplemented with new references. The book, as it is now presented, is a very accurate and systematic introduction into the modern theory of mathematical statistics. It can be recommended especially to those who have already acquired sufficient knowledge from real function theory and linear algebra and want to put their knowledge of mathematical statistics on a wider and more solid base.

K. Tandori (Szeged)

D. R. Smart, Fixed point theorems (Cambridge Tracts in Mathematics, Volume 66), VIII+93 pages, Syndics of the Cambridge University Press, Cambridge, 1974.

The book is an introduction, from the point of view of the functional analyst, to fixed point theorems and their applications. The only prerequisite it requires is a minimal knowledge of functional analysis, so it will be very useful for graduate students. For its small size the book deals with a considerably wide range of results. It presents several fixed point theorems for individual (one- and many-valued) mappings of different kinds, commuting and non-commuting families of mappings and also for mappings obtained by continuous deformation. Among others, fixed points of contractions of several kinds; Brouwer's fixed point theorem and its generalizations: the theorems of Schauder, Tychonoff and Rothe; furthermore, the fixed point theorems of Browder—Potter, Krasnoselskii, Leray—Schauder, Schaefer, Kakutani—Markov, and Ryll—Nardzewski are discussed. Fixed point theorems are applied to differential equations, the theory of games and are used to prove the existence of some invariant means such as the Haar measure on compact groups, the invariant mean on almost periodic functions, and the Banach limit.

In the book algebraic topology is used only in Chapter 10 where the discussion is only intuitive with references to rigorous arguments. Proofs are mostly complete and always easy to understand. However, there are a few incomplete proofs (for example, the first proof of Brouwer's theorem relies on the fact that the n-sphere is non-contractible, which is not proved in the book). In such cases references to complete proofs are always provided.

The book consists of 11 chapter, most of them also contain exercises. An index and a bibliography are included.

J. Szűcs (Szeged)

B. L. van der Waerden, Group Theory and Quantum Mechanics (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 214), VIII+211 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1974.

The original, German edition of this book appeared in 1932, in the same series. It is with nostalgy that the reviewer recalls how he was influenced, as a young student, by reading this book. Not only did he learn from it this — at that time so novel — method, the role of group representations in the theory of atomic and molecular spectra, but he was also fascinated by the clear and concise way of exposition.

The present English edition is not a mere translation. Indeed, the whole volume was rewritten so that it has become longer by a third, and a large amount of newer development is taken into consideration. (Curiously enough, Chapter 6, on Molecule Spectra, which "was too much condensed in the German edition", has become shorter by a third.)

Béla Sz.-Nagy (Szeged)

E. S. Wentzel—L. A. Owtscharow, Aufgabensammlung zur Wahrscheinlichkeitsrechnung, 353 Seiten, Berlin, Akademie Verlag, 1973.

Das vorliegende Buch ist eine stark überarbeitete Übersetzung des russischen Originals. Es besteht aus zehn Kapiteln, die außer des Standard-Stoffes der Wahrscheinlichkeitsrechnung auch die Gebiete der stationären und Markowschen Prozesse umfassen. Neben den wohlbekannten Würfel- und Urnenproblemen behandeln viele Aufgaben auch reale Anwendungen z. B. aus dem Militärwesen, Technik und Bedienungstheorie, jedoch kann man nicht sagen, daß durch Lösung dieser Aufgaben der Leser einen Überblick über alle Anwendungsgebiete der Wahrscheinlichrechnung erhält.

Am Anfang jedes Kapitels werden die wichtigsten theoretischen Grundlagen zusammengefaßt. Zu jeder Aufgabe wird das Ergebnis, bei komplizierteren Problemen auch die ganze Lösung angegeben. Damit eignet sich die Aufgabensammlung gut zum Selbststudium. Auswahl und Schwierigkeit der Aufgaben sind an die Erfordernisse der Ingenieur-Ausbildung abgestimmt. Tabellen der Poisson- und Normalverteilung vervollständigen das Buch.

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