entitled From Newton to Hausdorff, the author summarises in a dozen pages the movement of ideas which culminated in the notion of an abstract topological space.

The author's method is to give in the various chapters brief summaries of the works which marked important steps in the development of the ideas which proved to be important, supported by an extensive bibliography of primary sources and a much smaller one of secondary sources. Some efforts which proved abortive are also recorded. In the author's words, this is a story of mathematics, not of mathematicians. This, however, is not necessarily the complete story since it takes no account of the interplay of personalities, which is often important. No personal details are given. But within the limits he has set himself the author has organised his material with skill and judgment to produce a book of much interest on the genesis and maturation of one of the great formative influences in modern mathematics.

There are some surprising omissions. There is no mention of René Baire or of the important notion of the category of a set which he introduced. The Youngs' famous book *The Theory of Sets of Points* (1906) is not in the bibliography nor is W. H. Young mentioned. Another omission is the Schoenflies Report of 1900 to the Deutscher Mathematiker Vereinigung; but perhaps most important of all is the omission of the Cantor-Dedekind correspondence (*Briefwechsel Cantor-Dedekind*, edited by E. Noether and J. Cavaillès, 1937) which reveals very clearly how much Cantor relied for support on the friendly critical judgment of Dedekind from 1872 onwards. A few misprints were noted; in a future edition Emil Borel should be corrected to Émile, Elias Hastings Moore to Eliakim and Everit W. Beth to Evert. But these are minor blemishes which do not detract from the value of a book which deserves a place in every library catering for history of mathematics.

E. F. COLLINGWOOD

SIERPIŃSKI, WACŁAW, *A Selection of Problems in the Theory of Numbers*, translated from the Polish by A. Sharma (Popular Lectures in Mathematics, Vol. 11, Pergamon Press, 1964), 126 pp., 30s.

This fascinating little book begins with a section of problems on the borders of geometry and number theory, such as A. Schinzel's result that for every positive integer n there exists a circle on whose circumference there lie exactly n points with integral coordinates. The greater part of the book is concerned with properties, proved and conjectured, about prime numbers, and the last section lists one hundred elementary but difficult problems. These are classified as of the first or second kind. A problem of the first kind is one for which we know how to obtain a complete solution, the only difficulty being that we are not in a position to perform all the necessary computations, even with modern computing methods, because of their length. All other unsolved problems are of the second kind. A few of the problems stated have been solved and references are given. (Erratum: on p. 116 in Problem 77 replace 1 by >1.) Although the translation could be improved in places, this does not detract from the great interest of the book which can be understood by the intelligent layman.

R. A. RANKIN

MARGULIS, B. E., *Systems of Linear Equations*, translated and adapted from the Russian by Jerome Kristian and D. A. Levine (Pergamon Press, 1964), 88 pp., 17s. 6d.

This is Volume 14 of the series "Popular Lectures in Mathematics", edited by I. N. Sneddon and M. Stark, and is included in a survey of recent East European mathematical literature conducted by A. L. Putnam and I. Wirszup of the University of Chicago.

A great merit of this little book is that it is virtually self-contained, nothing being assumed beyond the fundamental concepts of a linear equation and systems of linear

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equations. The contents include: (i) general methods of investigating and solving systems of linear equations; (ii) convenient, practical methods for solving systems approximately or exactly; (iii) the real meaning of inconsistent systems and their approximate solution; (iv) the graphic solution of systems and the application of these methods to the solution of some problems in science and engineering. In such a compact volume, the discussion is understandably limited to systems involving only a small number of variables, but the arguments are presented with such clarity that the reader can easily extend them to more complex systems.

The opening chapter is devoted to deriving several systems of linear equations from physical problems, on application of Kirchoff's laws to an electrical circuit, for example. Subsequent chapters deal with basic definitions and methods of solution of systems, including detailed discussion of such techniques as reduction to triangular form, use of Gauss' tables, Cramer's rule, and methods of classification of systems. The section dealing with the approximate solution of systems, both consistent and inconsistent, is especially pleasing, as illustrated by the author's lucid exposition of the method of least squares. Finally, graphical solutions are given in detail for systems involving less than four variables. Worked examples throughout are based on the systems arising in the opening chapter, while each chapter concludes with exercises based on the text. Errors are limited to four misprinted symbols.

The author has striven, with the greatest success, to produce a book which is eminently readable. Both exposition and layout are outstanding; all proofs and discussions are given in the fullest detail, so that this book can be most strongly recommended for unassisted reading by any undergraduate student of science or engineering, at whom it is primarily aimed. D. J. TEMPERLEY

KANTOROVICH, L. V. AND AKILOV, G. P., *Functional Analysis in Normed Spaces*, translated from the Russian by D. E. Brown, edited by A. P. Robertson (Pergamon Press, 1964), xiii+771 pp., 140s.

Part I of this large book is mainly a leisurely and expanded version in 462 pages of classical functional analysis, namely those parts of Banach's *Théorie des opérations linéaires* that have become standard tools of analysis. Much emphasis is placed on the identification of bounded linear mappings between certain concrete function spaces, and there is a useful account of Sobolev's generalisation of the Poincaré inequality. Part I also contains the elements of the theory of Hilbert spaces, including a proof of the spectral theorem for bounded self-adjoint operators, and ends with a chapter on linear topological spaces which seems almost entirely unrelated to the rest of the book.

The first two chapters of Part II (XII Adjoint equations, XIII Functional equations of the second kind) also consist of standard Riesz-Schauder-Banach theory; and so it seems to the reviewer that the real justification for the translation of this book lies in its last five chapters:—XIV. The general theory of approximation methods, XV. The method of steepest descent, XVI, The fixed point principle, XVII. The differentiation of non-linear operations, XVIII. Newton's method. These cover much less readily accessible material, and illustrate it with a wealth of concrete applications.

The reviewer would not recommend Part I as an introduction to functional analysis in competition with the many excellent books that have appeared in recent years. However the book is welcome for its last five chapters, and for the illustrations that it contains of some of the applications of functional analysis to differential equations. It may be a useful reference book for numerical analysts and applied mathematicians, but the reader who uses the book for occasional reference must use some care. For example, the word " linear " is not used in the sense now usual in the west, and in a