BOOK REVIEWS

Funktionentheorie. By Hellmuth Kneser. Göttingen, Vandenhoeck and Ruprecht, 1958. 422 pp., DM 34.

The author has devoted this work on functions of complex variables to those parts of this extensive field which he considers of use to the reader, giving preference to results which can be established by functiontheoretic methods. The treatment of the elementary parts of the subject, complex numbers in Chapter 1 and basic properties of analytic functions in Chapter 2, is somewhat brief but essentially complete. A novel feature is the inclusion of results on analytic functions of several complex variables, many but not all of which are analogous to the results for one variable. Early in Chapter 2, page 42, we find analyticity for several variables defined in terms of total differentiability. And near the end of Chapter 2, page 124, we find a discussion of the preparation theorem of Weierstrass and the structure of implicit functions of several variables in a neighborhood.

Chapter 3 begins with some results on singularities of power series. But it is mainly concerned with entire and meromorphic functions. It then discusses the Mittag-Leffler partial fraction and the Weierstrass product expansion theorems, order and growth of entire functions, and certain special functions such as the gamma function, elliptic functions, elliptic modular functions, and the Riemann zeta function. A proof of the Cauchy integral theorem for functions of several complex variables, and its application to the extension of the Mittag-Leffler expansion theorem for such functions, is given in the appendix.

Chapter 4 deals with analytic configurations. Some traditional synonyms occasionally appear. Thus we find "multiple-valued functions" used as a chapter heading. And the term "analytic functions" is mentioned, with the explanation that these are not "functions," i.e. having unique values. Riemann surfaces for algebraic functions are described, as well as Abelian integrals thereon. The analytic nature and singularities of certain solutions of differential equations, in particular the hypergeometric functions, are treated. The fifth and final chapter is concerned with conformal mapping. It includes the Riemann mapping theorem for simply-connected regions, its application to the Schwarz-Christoffel formula for a polygon, and the mapping of doubly-connected regions.

A few references are given at the ends of the last three chapters, and some others appear in footnotes. There are very few exercises, and not many illustrative examples. Thus, in §2.15 only seven explicit integrals which can be found using residues are mentioned. The discussion of the last on page 119 with integrand $(\ln z)^2/(1+z^2)$ is inadequate, since if I_1 is the integral from 0 to ∞ and I_2 is that from $-\infty$ to 0, some nontrivial manipulation is needed to show that $I_2=I_1-\pi^3/2$, a preliminary to $2I_1-\pi^3/2=-\pi^3/4$, which then gives the result correctly stated at the end of 2.153.

The omission of examples together with the brevity of the exposition, explain how the author has managed to include so many topics in a single volume. But on the whole, this book may be highly recommended to any reader desiring a broad knowledge of function theory from a compact presentation.

PHILIP FRANKLIN

Contributions to the theory of games, Vol. 4. Ed. by A. W. Tucker and R. D. Luce. (Annals of Mathematics Studies, No. 40.) Princeton University Press, 1959. 9+453 pp., $6.00 (paperbound).

This is the fourth, and at present writing intended to be the last, volume on the theory of games in the present series. It is devoted to n-person games, which are very much more complicated than two-person games because formation and disruption of coalitions and making side payments are permitted. The present volume, as its predecessors, is prefaced by an introduction which describes the general state of the theory and summarizes the contents of each paper. This introduction is itself an excellent review and makes further comment here unnecessary. The general remarks made by the reviewer in his review of the preceding volume of this series (Bull. Amer. Math. Soc. vol. 65 (1959) pp. 101–102) apply here as well.

J. WOLFOWITZ

Lie groups. By P. M. Cohn. (Cambridge Tracts in Mathematics and Mathematical Physics, No. 46.) New York, Cambridge University Press, 1957. 7+164 pp., $4.00.

It is only in recent years that the study of Lie groups as global objects has come to be considered a subject of general interest. Until that time, it was customary to study only the "group germ" of a group which, upon analysis of the best-known literature, was some unspecified neighborhood of the identity element of the group. Among the familiar works along this line we find Eisenhart's book on continuous groups, while a quite recent discussion of the same nature is found in a chapter of Schouten's *Ricci calculus* (second edition).