

*Bessel Functions for Engineers.* By N. W. McLachlan. Oxford, Clarendon Press, 1934. xi+192 pp.

This is the fourth volume of the Oxford Engineering Science Series. The purpose of the book is to provide engineers and engineering students with a course on Bessel functions and their practical applications. In conformity with this purpose the book is mainly concerned with expansions, formulas, and properties of the functions which are found useful in applications. The mathematical discussions are straightforward and formal with occasional use of the expression "it can be shown." The applications are mainly mechanical and electrical with particular attention to loud-speaker horns—a subject in which the author is particularly interested. The book contains about 600 examples (with answers) to be solved by the reader. At the end there is a rather extensive collection of formulas and brief tables of the principal functions.

H. B. PHILLIPS

*Theorie den Konvexen Körper.* By T. Bonnesen and W. Fenchel. Berlin, Springer, 1934. vii+164 pp.

This monograph is the first part of the third volume of the excellent series, *Ergebnisse der Mathematik und ihrer Grenzgebiete*, published by the Zentralblatt für Mathematik. It contains an exhaustive exposition of the theory of convex bodies in  $n$ -dimensional spaces, in all its ramifications and connections with differential geometry. Even a superficial perusal of the book will give the reader a clear idea of the importance and interest of this subject which unfortunately is not as widely known as it should be. A more attentive reading will reveal a multitude of results of a perfect beauty and will urge him to turn to a serious study of this fascinating field.

The monograph starts with exposition of fundamental notions of convex sets and bodies, of convex hulls, planes of support, centers of gravity, and classification of boundary points of a convex body (§§1–3). The relationship with the theory of convex functions and their applications to the problem of representation of convex bodies are shown next (§4). The following articles, §§5–6, treat of linear combinations of convex bodies, of linear and concave families of convex bodies, of convergent sequences of convex bodies, and of approximation of convex bodies by means of polyhedra and of analytic convex surfaces. Various important quantities and figures connected with convex bodies are discussed in §§7–8. Such are volume and mixed volume, cross sections, surface area, width, diameter, thickness, and the like. Special attention is given to the integral formulas for volumes and mixed volumes in terms of point coordinates and of functions of support (Stützfunktionen). Next, §§9–10 contain extensions of the methods of symmetrizing which were first introduced by Steiner in his classical investigations on the isoperimetric properties of a circle. Various extension problems and inequalities naturally belong here. Various proofs of the important theorem of Brunn-Minkowski and its numerous applications are treated in §§11–12. Next, §13 deals with the problem of determination of a convex body by means of its curvature functions, including uniqueness and existence theorems. Various special cases of convex bodies (such as convex bodies possessing a center, bodies of constant width, convex

quadric surfaces) are discussed in §§14, 15, and 16. The last article, §17, contains indications concerning the differential geometry in the large of convex curves and surfaces. The monograph closes with a rather complete bibliography. The reading of this remarkable monograph at places is not very easy, but is extremely suggestive and the total result is well worth the effort.

Being primarily interested in the theory of convex *bodies*, the authors did not enter into discussion of the theory of convex *functions* as such. The exposition of this theory, which plays such an important role in the modern development of analysis and theory of functions, would require an extended monograph of its own. Let us hope that such a monograph will appear soon in the *Ergebnisse* series, and that it will prove just as exciting as the monograph by Bonnesen and Fenchel.

J. D. TAMARKIN

*Lezioni sulla Teoria Geometrica delle Equazioni e delle Funzioni Algebriche.* By F. Enriques and O. Chisini. Volume 4, *Funzioni Ellittiche e Abelianae.* Zanichelli, Bologna, 1934. viii+274 pp.

This fourth volume concludes the series of magisterial lectures on algebraic geometry by Enriques with the collaboration of Chisini. They composed it during a vacation-sojourn in the country, and afterwards used it as the base of a course of lectures at the Universities of Rome and Milan, respectively.

The *Lezioni* are designed as preparatory for students who intend to take courses in which more advanced developments of algebraic geometry are given. In this task the authors have succeeded admirably. The student who masters Enriques and Chisini's lectures will have a foundation in algebraic geometry which cannot be matched anywhere else in the world.

Enriques himself promises to continue this work by treating in the same spirit algebraic surfaces or the algebraic functions of two variables.

The fourth volume contains the sixth book of the general treatise: *Elliptic and Abelian Functions*. In the first chapter, we find a very clear and concise treatment of elliptic integrals and functions with which every student of algebraic geometry should be familiar. One may of course expect that the geometric aspect of the theory is stressed in opportune places without impairing the rigor of the argument. Thus, the flex-configuration of the plane cubic, linear point-series and correspondences on elliptic curves are very adequately treated.

The second chapter is concerned with Abelian integrals and appears as an extension of the function-theoretical and geometric theories so beautifully explained in Chapter 1.

In the last chapter, the authors discuss the famous problem of inversion and Abelian functions. Here again we see at every turn the hand of master geometers handling an otherwise purely analytical theory.

The volume ends with an application of Abelian functions to hyperelliptic and Kummer surfaces. As in the preceding volumes, at the end of every chapter we find a very competent and accurate account of the historical development of the theory.

Enriques and Chisini have written a beautiful book which may be strongly recommended to student and teacher alike.

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