SHORTER NOTICES

Höhere Mathematik für Mathematiker, Physiker, und Ingenieure. By R. Rothe. Teil IV: *Übungsaufgaben mit Lösungen. Formelsammlung.* Edited by O. Degosang. Heft 4: *Unendliche Reihen. Vektorrechnung nebst Anwendungen.* Heft 5: *Raumkurven und Flachen, Linienintegrale und Mehrfache Integrale.* Heft 6: *Gewöhnliche und Partielle Differentialgleichungen nebst Anwendungen.* Leipzig and Berlin, Teubner, 1937. 161 pp.

The previous parts of this volume of exercises have been noted in this Bulletin, vol. 39 (1933), p. 492; vol. 40 (1934), p. 202; and vol. 43 (1937), p. 12. The fourth part contains exercises in infinite series, integrals depending upon a parameter, determinants, and elementary vector analysis. The type of exercise, arrangement, and character is similar to that of the preceding volumes.

Parts 5 and 6 bring to a close the parts of the fourth volume of this work, giving an exercise collection for the preceding volumes. They present a list of interesting exercises on the topics mentioned, as well as their solutions. For the teacher of calculus, these parts contain suggestive exercise material. Worth mentioning in Heft 5 might be the exercises giving practice in the evaluation of line integrals and the determination of the volume elements for a variety of sets of coordinate surfaces. Noticeable in Heft 6 is the comparative absence of applications to other than mathematical fields.

Taking this exercise collection as a whole, we find that it contains much which is ordinary and much which is different and suggestive. The solutions given are for the most part excellent, but for the inquiring student a little more emphasis on the fact that other simple solutions exist might prove worth while.

T. H. Hildebrandt

Postulates for Assertion, Conjunction, Negation, and Equality. By Edward V. Huntington. Proceedings of the American Academy of Arts and Sciences, vol. 72, no. 1, 1937, pp. 1–44.

The author gives a set of postulates for an abstract mathematical system which has a certain formal correspondence with Lewis' system of strict implication. Consequences of the postulates are developed in some detail, with proofs given in full, so that the paper is in this way entirely self-contained. The consistency of the system, the independence of the postulates, and a number of additional propositions of independence are established by an interesting series of examples.

Under the possible interpretations of the abstract system which are indicated in the paper, the elements of the system become either (1) a finite set of integers or (2) the sentences of an unspecified language L. In case (1) the system itself becomes a kind of finite algebra; in case (2) it becomes a branch of the syntax of L. It is an interpretation of this second kind which the author declares himself to have chiefly in mind.

The usual postulational method, which is here employed, presupposes a fully developed logic in terms of which the consequences of the postulates are derived; hence it may not without circularity be used in the development of logic itself. For this reason the author's system is not interpretable as a logic, and his comparisons with the propositional calculus of *Principia Mathematica* and with the calculus of strict implication as developed in Lewis and Langford's *Symbolic Logic* are to this extent erroneous. So far, however, as the form of the development may be taken as implying an opinion that Lewis's theory of strict implication is from the point of view of intuitive justification better formulated as a syntax than as a logic, the reviewer finds himself in complete agreement with the author.

ALONZO CHURCH

Introduction to the Theory of Groups of Finite Order. By Robert D. Carmichael. Boston, Ginn and Co., 1937. 16+447 pp.

The fundamental place occupied by the group concept in modern mathematics and the discovery of new and important applications of the theory of groups have made it necessary for every serious student of mathematics to acquire a working knowledge of this subject. Professor Carmichael's book will find a large audience, as it is addressed to the beginner, not to specialists, and makes no claim to including the most recent discoveries in group theory. The exposition is excellent throughout. The book includes a large number of exercises of varying degrees of difficulty which will enable the learner to cultivate the subject as assiduously as he desires.

The first part of the book treats those topics which are indispensable to all works on the theory of groups: abstract groups, abelian groups, prime-power groups, permutation groups, linear groups in the field of complex numbers, and the theory of group characters. A full discussion of finite fields is followed by a treatment of linear groups in a finite field with emphasis on certain multiply transitive permutation groups whose existence is established most readily by means of linear groups. The author calls attention to certain doubly transitive groups overlooked by Burnside.

Geometers will be particularly interested in the chapters on finite geometries which contain an exposition, from the group standpoint, of the researches of Veblen and Bussey. The chapter on algebras of doubly transitive groups includes Dickson's researches on finite algebras and will appeal to mathematicians interested in linear algebras. The final chapter is devoted to tactical configurations. The latter part of the book is particularly valuable, as it includes material widely scattered throughout the literature and here collected and systematized for the first time.

LOUIS WEISNER

Höhere Algebra. II. Gleichungen höheren Grades. By Helmut Hasse. Zweite verbesserte Auflage. (Sammlung Göschen, vol. 932.) Berlin, de Gruyter, 1937. 158 pp.

The new edition is in the main the same as the first edition, giving the principal results of the Galois equation theory. The results are, however, derived under somewhat more general conditions, since the author has dropped the former limitation to perfect fields and considers separable extensions in general. There are also various minor additions and improvements. A short account of the theory of finite fields is added.

OYSTEIN ORE

An Introduction to Projective Geometry. By C. W. O'Hara and D. R. Ward. Oxford, Clarendon Press, 1937. 298 pp.

The point of view of the authors is best stated in the preface: "It cannot with truth be said that the book has been written to 'supply a long-felt want.' There seems, unfortunately, to be very little demand for the teaching of Projective Geometry in