SHORTER NOTICES

Algebra. By Oskar Perron. Berlin and Leipzig, Walter de Gruyter, 1927. Two volumes. Volume I. *Die Grundlagen.* 4 figures; viii+307 pp. Volume II. *Theorie der algebraischen Gleichungen.* 5 figures; viii+243 pp. Göschens Lehrbucherei, I. Gruppe: Reine Mathematik, Band 8, 9.

In view of the large number of texts on higher algebra already on the market, the average mathematician is not apt to hail a new book on this subject with joy or even interest. As one's eye runs hastily down the table of contents and sees a sequence of titles that calls to mind a composite picture of Weber, Serret, Burnside and Panton, et al., one can certainly be excused if one does not at first wax enthusiastic. In fact, the chapter-headings in Volume I are, in order: fundamental notions; polynomial theorem and Taylor's theorem; determinants (including the elements of matrices and of bilinear, quadratic and Hermitian forms); symmetric functions; divisibility of polynomials; existence of roots; and in Volume II the chapter-headings are: numerical solution of equations; reciprocal equations and equations of degree $\geqq 4$; substitution groups; Galois' theory of equations; equations of degree 5. Moreover, the captions of the sub-divisions of the eleven chapters are, generally, the classic ones. Thus, first impressions lead one to expect merely one more book to add to the library catalogue and to which a beginning graduate student will look for help when Weber, Serret et al. happen to be in use. But, fortunately, first impressions are unjust in this case. For there are two places in the book where the treatment is sufficiently different from the classic treatment to interest a reader familiar with the usual treatise on the subject.

Probably the outstanding characteristic of the book is the prominence which is given to the notion of field (domain of rationality). This is certainly good pedagogy, for this is one of the most important concepts in mathematics. To be sure, the most central notion of all algebra is that of a linear algebra (hypercomplex numbers) including as special cases fields, groups, matrices and integral equations. But it would be too much to expect the author of a comparatively elementary text to display his various topics as special cases or applications of linear algebras; and we are glad to see that he has clustered the more strictly algebraic parts of his book around the notion of field. In particular, he has presented the subject of the divisibility of polynomials in one or more variables in such a way that there are not those annoying exceptions in the statement of the theorems about the highest common factor of two polynomials in two or more variables, as in Bôcher's text. Also, the emphasis on fields in the first volume admirably prepares the way for the discussion of Galois' theory of equations in the second volume. Although the notion of field is always used in this subject, of necessity, yet the author's presentation is such as to give to the student a number of important theorems about algebraic fields which he does not usually see formulated outside a course in algebraic numbers