BOOK REVIEWS

Algebraic projective geometry. By J. G. Semple and G. T. Kneebone. Oxford University Press, 1952. 8+404 pp. $7.00.

This work is similar in style and treatment to Semple and Roth's *Introduction to algebraic geometry*, but more elementary in scope; in fact the latter work, though it appeared earlier, can well be regarded as a sequel and continuation of the present one. On the other hand, it nearly coincides in scope, and in the fundamental point of view, with Todd's *Projective and analytical geometry*, but it uses a much simpler and more elementary technical apparatus.

A couple of introductory chapters deal with the parallel developments in the idea of geometry, on the one hand from descriptions of spatial phenomena, through the applications of algebraic technique, to the concept of geometric entities as defined in algebraic terms, which admits the extensions to any number of dimensions and to an arbitrary ground field (in the book, however, the field of complex numbers is the assumed ground field throughout); and on the other hand by extensions of the invariance group, from Euclidean through affine to projective geometry. This occupies about a tenth of the book. In the rest, complex homogeneous coordinates are the material, and the linear algebra of these the topic.

A chapter is devoted to one dimension, cross ratio, the homographic transformation, etc.; another chapter to the plane and the projective relations between ranges and pencils in it. The conic, and systems of conics, occupy the next four chapters; many metrical interpretations of projective results are pointed out, such as the treatment of confocals as a range or linear family of envelopes. This part of the book reaches its climax in an unusually luminous account of invariants. After a chapter on collineations, correlations, and the most elementary Cremona transformations (little of the last is treated except the quadratic transformations on three points; on the other hand collineations are carefully classified by means of the characteristic roots and vectors of their matrices) we turn to three dimensions.

Here after a preliminary chapter on the general relations between points, lines, and planes, the quadric locus and envelope are treated, classified, like the conics, by the rank of their coefficient matrices, and studied, for the general case, mainly in terms of the two generating reguli, and the appropriate parametrisations. Before considering families of quadrics there is a digression on the twisted cubic, and