

The parametric representation of a one-dimensional configuration is developed at length and much attention is paid to cyclic projectivities and, in particular, to involution. In the plane and in space the Möbius net is used considerably and correlations as well as collineations receive their due share of attention.

In dealing with the transformation of a line, a plane or of space into itself the nature of the invariant configuration is not developed with as much completeness as it might have been, nor are the canonical forms of the equations of the transformations as thus classified given even for the case of the line.

The group idea is not considered at all although the word group is used twice, parenthetically. It would seem reasonable that, in a book of over three hundred pages devoted to the consideration of projective transformations only, space might be found to show at least the relations which the euclidean and projective geometries bear to their respective groups.

The appearance of the book is sufficiently described by saying that it appears in the *Sammlung Schubert*. There are some typographical errors, of which those noticed as most apt to confuse the student may be mentioned here. On page 8 in the definitions of h_1 and k_2 the e_1 and e_2 should be interchanged; on page 71, line 14, for 5 read 7; on page 76, line 1, for 40 read 11; and on page 87, line 15, b'_1 and b'_2 should be interchanged. An error appears on page 92: the third line from the bottom should read

$$c = 0, a + b = 0 \text{ and } b + d = 0,$$

so that the last equation on the page should be

$$\lambda\lambda' - \lambda + 1 = 0.$$

It is then unnecessary to make the change in parameters on page 93 which shows the identity of the two cyclic projectivities under discussion.

The book contains much that is interesting and helps to fill a decided gap in the works on geometry.

ARTHUR SULLIVAN GALE.

Aufgaben aus der niederen Geometrie. Von IWAN ALEXANDROFF, mit einem Vorwort von Dr. M. SCHUSTER. Leipzig, Teubner, 1903. vi + 123 pp.

ANYTHING tending to systematize the solution of the "originals" of elementary geometry is welcomed as an aid to

the study of geometry, and the value of Alexandroff's book is evidenced by the translations which have appeared in France and now in Germany. The book consists of approximately a thousand problems of construction, many of which are solved.

The first chapter of 10 pages consists of simple constructions and theorems of a fundamental nature.

The second chapter dealing with problems of construction and methods of solution covers pages 11-91 and forms the most important part of the book. It is noteworthy for its systematic development. The methods of construction employed are eight in number; the method of geometric loci, transformations of similitude, solving the converse problem, transformations of symmetry, translation, rotation about an axis, rotations about a point, and inversion.

In a third chapter, pages 92-108, problems from plane and solid geometry are solved by the use of algebra, and in the concluding chapter miscellaneous problems are found.

While the book is too advanced for use in the preparatory schools, it might well be placed in the hands of those students who plan to teach in these schools without having done graduate work.

ARTHUR SULLIVAN GALE.

Conceptos fundamentales de Analisis matematica. Por LAURO CLARIANA RICART, Catedratico de la Universidad de Barcelona. Barcelona, Juan Gili, 1903. 192 pp.

THE learned author states in his preface that the aim of the book is to contribute to the popularization of mathematical science by treating not of the subjects usually contained in elementary manuals, but of those fundamental concepts of mathematical science which are of special importance either for their historical value or for their utility in science. The contents embrace negative quantities, imaginary quantities, the equipollences of Bellavitis, the quaternions of Hamilton, circular and hyperbolic functions, derived functions, congruences, the symbols of Wronski, the theory of algebraic forms, etc. The author treats not only of the fundamental ideas of these branches of analysis, but also of their fundamental principles. His presentation is marked by scientific exactness and philosophical penetration. To one who can read Spanish and who has been truly initiated into mathematical science, the book must be charming, for it serves as a guide to several of the most interesting fields of exact science.

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