New First Course in the Theory of Equations. By L. E. Dickson. New York, Wiley, 1939. 10+185 pp.

Of the author's three books on the Theory of Equations this new book is most closely akin to his "First Course in the Theory of Equations," the most recent of the three. It is, however, much more than a mere revision of the latter text.

The order of the topics treated has been changed so that now the progress of the reader is from the simpler to the more complex. The number of the problems has been increased and they have been carefully worked out to illustrate the theory with a minimum of computation.

The New First Course, though only slightly longer than the old First Course, lacks little that the latter contained. When such omissions occur they are usually replaced by something more interesting. For instance Waring's formula for the sum of kth powers of the roots of an equation in terms of its coefficients together with its involved proof has been deleted and in its place appears Brioschi's elegant determinant form for the sum for $k=2, 3, 4$.

With the space saved by simplifying the proofs numerous new features are added. There is, for one thing, a more careful approach to determinants and the proofs for the general theory of linear equations are considerably clarified by the introduction of matrix concepts.

The discussion of trisection of angles is made so clear that the following theorem could safely be stated: anyone who seeks a method for trisecting all angles with ruler and compasses alone has not read this book.

There is one new simplification in the treatment of Sturm's functions which considerably shortens numerical computation.

Even if the reviewer were not predjudiced in favor of the author he could not fail to rejoice at the advent of this New First Course.

B. W. JONES

Projektive Geometrie. By Heinz Prüfer. Leipzig, Akademische Verlagsgesellschaft, 1939. 8+314 pp.

The first half of this book is devoted to the usual topics of synthetic geometry of the first and second order in one, two and three dimensions, including polarity. It is based on the operations projection and section, but independently of intuition. Each step is rigorously defined and explained in terms of the axioms used, including continuity. But that space is three dimensional is tacitly assumed without an axiom of closure. The Playfair statement is the form adopted for the parallel axiom. An unusually large amount of material is satisfactorily discussed in these 150 pages. No exercises are provided for the student. No use is ever made of imaginary elements.

Then follows a chapter on metrical geometry, mostly confined to two dimensions. This is particularly well done. The concept of perpendicularity is introduced by axioms; the involution of pairs of perpendicular lines of a pencil and a polarity having no curve of incident elements are the only new ideas needed. These are applied to prove a number of metrical theorems of plane geometry, connected with triangles. For the sake of logical completeness, now follows a chapter on non-euclidean geometry. This is much harder reading; it is logically consistent, but pedagogically is less successful.

Throughout the book figures are used freely, but only as suggestions, never as an essential part of the proof. A chapter on descriptive geometry is hardly more than a sketch; it discusses so many principles in the short space available that a reader would be helpless in trying to apply them to any other than the simplest problems.

The final chapter is on coordinates in one and two dimensions. It is based on the fundamental theorem that three pairs of corresponding elements fix a one-dimensional projectivity, so that the correspondent of any fourth element is uniquely determined. The idea of cross-ratio is not explicitly introduced. After defining addition and multiplication geometrically, it is shown that the rules of ordinary algebra apply. In passing from homogeneous to nonhomogeneous coordinates, the statements are frequently too inclusive; as given they include division by a vanishing coefficient. After showing that loci represented by linear equations in point coordinates are straight lines, the analytic formulation of projectivity is discussed, and also correlation. The determination of the fixed elements is not taken up except in a few particular cases.

The style is on the whole pleasing; the book is easy to read. The printing is excellent, only two typographical errors having been found. The work is provided with a full index.

VIRGIL SNYDER

Contributions to the Mechanics of Solids. (Dedicated to Stephen Timoshenko by his friends on the occasion of his sixtieth birthday anniversary.) New York, Macmillan, 1938. 277 pp.

The preface states that the idea of producing this book to commemorate the sixtieth birthday of Stephen Timoshenko, formerly professor of engineering mechanics at the University of Michigan, was conceived almost simultaneously by several of his present and past associates in colleges and industries. The book consists of a short biography of Professor Timoshenko followed by twenty-eight independent articles on various aspects of "stress and strain," written by prominent men in science and industry on both sides of the Atlantic.

Many of the articles discuss rather particularized engineering phases rather than general principles or analytical mathematics. The average technical reader will find some interesting features in such articles as "Developments in Photoelasticity" (non-mathematical), "Effect of a Flexible First Story in a Building Located on Vibrating Ground," "Dynamic Stability of Railway Trucks," "Use of Orthogonal Functions in Structural Problems," and "Hamilton's Principle and the Principle of Least Action in the Solution of Creep Problems." The above titles illustrate the range and mutual independence of the articles which constitute the book. The reviewer feels that it would have been of more interest and value to have assembled more correlated discussions of topics in the field of the mechanics of solids.

J. K. L. MACDONALD

Foundations of Logic and Mathematics. By Rudolf Carnap. (International Encyclopedia of Unified Science, vol. 1, no. 3.) Chicago, University Press, 1939. 8+71 pp.

This monograph presents in condensed form and with a minimum of formal detail the author's views concerning the relation of logistically formalized calculi to language in the ordinary sense, and concerning the application of such calculi in empirical science. It is a noteworthy contribution to philosophy of science and in particular to analysis of the relationship between pure and applied mathematics, the questions involved being made much more precise and intelligible than would otherwise be possible, through use of the methods of modern symbolic logic.

In many respects the author's views are here modified or clarified in such a way as to remove serious objections previously urged against them.