Lie's theory of continuous groups plays such an important part in the elementary problems of the theory of differential equations, and has proved to be such a powerful weapon in the hands of competent mathematicians, that a work on differential equations, of even the most modest scope, appears decidedly incomplete without some account of it. It is to be regretted that Mr. Forsyth has not introduced this theory into his treatise. The introduction of a brief account of Runge's method for numerical integration is a very valuable addition to the third edition. The treatment of the Riccati equation has been modified. The theorem that the cross ratio of any four solutions is constant is demonstrated but not explicitly enunciated, which is much to be regretted. From the point of view of the geometric applications, this is the most important property of the equations of the Riccati type. The theory of total differential equations has been discussed more fully than before, and the treatment on the whole is lucid. The same may be said of the modified treatment adopted by the author for the linear partial differential equations of the first order. A very valuable feature of the book is the list of examples.

E. J. WILCZYNSKI.

Introduction to Projective Geometry and Its Applications. By ARNOLD EMCH. New York, John Wiley & Sons, 1905. vii + 267 pp.

To some persons the term projective geometry has come to stand only for that pure science of non-metric relations in space which was founded by von Staudt. To others the original significance of the word, implying an actual projection of one metrical space upon another, still remains essential. The author of this book belongs to the latter class. He starts from metric and descriptive geometry. In the development of the matter treated in the text there is no trace of any kind of purism. Analytic and synthetic methods are everywhere used impartially. The result is a book which will certainly appeal to students of engineering and others who desire to use projective geometry in practical work.

Although there is to be found, especially in the later chapters, much which should interest students of pure mathematics, there are a number of defects which cannot but detract from their enjoyment of the work. These seem to be in a great measure a matter of style. Thus on page 19 we find in italics :

"An involution of rays contains one, but only one, rectangular pair." On the next page, likewise in italics, is a second theorem: "An involution having more than one rectangular pair has all its pairs rectangular." These two theorems are, on their face, somewhat contradictory. Of course there is no difficulty in understanding their relation to each other, and there might be little cause for comment were it not for the fact that too many instances of this sort of infelicity in style are present. On page 68 the author states: "A plane figure may therefore be considered either as a configuration of points or as a configuration of straight lines. This is the principle of duality." Such a statement seems hardly definite enough to cover the case. The matter of dividing by factors which may be zero, the various special cases which may arise, in fact the whole modern demand for a greater accuracy in geometric work is not sufficiently regarded.* Apart from this the work has much to commend it. And those for whom the book was especially written will probably not think the defect very serious. To the reader, whoever he be, the uncommonly good index will be of great service.

E. B. WILSON.

Differential- und Integralrechnung; Zweiter Band: Integralrechnung. Von W. FRANZ MEYER. Mit 36 Figuren. Leipzig, C. J. Göschensche Verlagshandlung (Sammlung Schubert, number XI), 1905. 16 + 443 pp.

THE present volume is a direct continuation of the preceding one on differential calculus, to which constant references are made. Integration is first defined as the inverse of differentiation. It is treated analytically and applied to elementary algebraic, logarithmic, and trigonometric functions. The idea of summation is introduced by a very detailed discussion of successive approximations to the area of the parabola, then extended to any plane curve, first with equal intervals, then for any law of division. The oscillation of a function, and superior and inferior integrals are repeatedly mentioned and strongly emphasized.

The first theorem of mean value is introduced by the aid of a figure, then made precise and applied to several problems.

* See for example M. Bôcher on "A problem in analytic geometry with a moral," *Annals of Math.*, vol. 7, p. 44 (October, 1905).