

occasion. By many this is esteemed to be Halphen's chief work. Some account of it is given in the review of volumes I and II in connection with Poincaré's analysis of the memoir on pages xxx-xxxi of volume I.

Besides these two master memoirs, volume III of the *Oeuvres* contains the introductory article by C. Jordan already referred to, and two articles by Halphen closely related to the former of the two already treated. They both deal with linear differential equations of the fourth order: one is a brief note (pp. 457-461) from the *COMPTES RENDUS* and the other is a longer article (pp. 463-514) from the *ACTA MATHEMATICA* on the invariants of linear differential equations of the fourth order.

The four articles reprinted in this volume may justly be said to contain two great contributions by Halphen. The one is the memoir on twisted algebraic curves and the other is the work on linear differential equations contained in the first, third and fourth papers. These are all entirely inspired by the theory of differential invariants (to which Halphen had previously made characteristic contributions); and they are treated together by Halphen himself (vol. I, pp. 32-35) in the summary of his work prepared by him on the occasion of his candidacy before the Paris Academy in 1885.

R. D. CARMICHAEL

*Graphical and Mechanical Computation.* By Joseph Lipka. New York, John Wiley and Sons, 1918. ix + 264 pp.

This book is something new in American text-books. It treats two subjects of vital importance to engineering students that heretofore have found little place in the curricula of American engineering schools. The first part of the book is devoted to the graphic solution of engineering problems by means of networks of scales, various kinds of coordinate paper, the charting of equations in three variables and more particularly by means of alignment charts. The second half of the book is concerned with the question of empirical formulas for both non-periodic and periodic curves giving numerical, graphic and mechanical methods for determining the constants. For data which cannot be fitted to convenient formulas, numerical, graphic and mechanical methods are developed in the last two chapters for interpolation, differentiation and integration.

The book is rich in illustrations and applications to practical engineering problems, showing clearly the value of the graphic methods in reducing the drudgery of long computations. The three chapters on alignment charts are recommended to the student who wishes to know something of the nomographic charts of Professor M. d'Ocagne. The work is also published in two volumes.

A. R. CRATHORNE

*Funktionentheorie.* By Konrad Knopp. 2d edition. Berlin and Leipzig, Vereinigung wissenschaftlicher Verleger. Part I, 1918, 140 pp. Part II, 1920, 138 pp.

This "Funktionentheorie" is a completely revised edition of the work that appeared under the same title in 1913 in the *Sammlung Göschen*. It is issued in a form similar to the old one by the *Vereinigung wissenschaftlicher Verleger* which, since the war, has continued the publishing