

SHORTER NOTICES

Exercices d'Analyse. Vol. 4. By Gaston Julia. Paris, Gauthier-Villars, 1935. iv+230 pp.

This is a fourth and worthy companion volume to the other three volumes of *Exercices d'Analyse* by the same author. It is given over wholly to the solutions of fifty-five problems in partial differential equations of the first order. Again, as in the earlier volumes, it is a set of exercises which figure in the program of certification of the differential and integral calculus at such institutions as the École Normale Supérieure and the Sorbonne, and which constitute further material supplementary to Goursat's classic *Cours d'Analyse*. Students preparing for the examinations of the licence and the agrégation will, of course, work through these volumes.

Some few of the problems are of such character that they might be treated in an elementary first problem course in differential equations,—exercises, for example in solving: (1) systems of the form

$$\frac{dx}{dt} = f_1(x, y, z), \quad \frac{dy}{dt} = f_2(x, y, z), \quad \frac{dz}{dt} = f_3(x, y, z);$$

(2) total equations $Pdx + Qdy + Rdz = 0$; (3) linear partial differential equations $Pp + Qq = R$; (4) the more general equation $f(x, y, z, p, q) = 0$, where the methods of Lagrange and Charpit may be used. For the most part, however, the problems are of a theoretical nature and suitable only to give to more mature students. Many of the exercises are solved in more than one way, and thus the established spirit of the series is maintained. Most of them are taken from past examinations, Paris predominating, some even dating back to the 1870's. More new material might have been included.

Problems with boundary conditions are treated only slightly and singular solutions not at all. Numerous applications are made to the field of geometry but none to physical problems. Free use is made of methods employing geometry, with and without coordinates, and also of the complex variable.

The printing is well done, on paper of improved quality.

C. O. OAKLEY

Cours de Cinématique. By Gaston Julia. Edited by Jean Dieudonné. Second Edition. Paris, Gauthier-Villars, 1936. 161 pp.

The writings of French scientists in general are undoubtedly outstanding for their grace and elegance of style. There is a smoothness and ease of development, with nevertheless a completeness and rigor, which makes them fascinating for reading and study. This little volume continues that tradition.

The author begins with the kinematics of a point and develops the elementary theory by a combination of vectorial and analytic methods.

In the second chapter the motion of a rigid body is considered, the broad