

problems. In addition to those interspersed throughout the text, there are to be found at the ends of the chapters and in a set of miscellaneous examples at the end of the book no fewer than 550 problems. Many of these are quite elementary in character and serve merely to familiarize the reader with the notions involved in the text. Many others contain significant theorems which would be demonstrated in a more extensive treatise.

Concerning the character of his exposition the author says in his preface: "In order to avoid making the subject too difficult for beginners, I have abstained from the use of strictly arithmetical methods, and have, while endeavoring to make the proofs sufficiently rigorous, based them mainly on geometrical conceptions." It is evident that the desirable golden mean here is a matter on which there is likely to be difference of opinion. The reviewer believes that the statements are sometimes too loose. Thus "closed region" is first defined on page 92. Yet several times on the earlier pages statements have been made involving the word "region" which are correct only when one understands "closed region." For cases in point see page 24, line 6 up; page 26, line 7; page 39, line 7 up. In theorem 2 of page 93 it should be specified that the path of integration is finite in length or the proof should be modified. For theorem 2 on page 39 one should read "No [closed] region can contain an infinite number of isolated singularities [and no other singularities]," the words in brackets being those which one must insert into the theorem to make it accurate. These may be taken as examples of loose statements which are all too frequent, especially in the first 131 pages, in which the more general matters are treated.

A student who has been forewarned against these somewhat loose statements will find the book one by the reading of which he will be much profited. Many persons will probably find it also a suitable source of elegant elementary problems for enforcing a clear understanding of numerous fundamental notions and theorems.

R. D. CARMICHAEL.

*Leçons sur les Fonctions Elliptiques en Vue de leurs Applications.* Par R. DE MONTESSUS DE BALLORE. Paris, Gauthier-Villars, 1917.

THE object of these lectures, which M. de Montessus de Ballore delivered at the Faculté des Sciences of Paris in 1915-

1916, is to present in an elementary manner the fundamental properties of the ordinary elliptic functions. The first part deals with the Jacobian functions  $\operatorname{sn}$ ,  $\operatorname{cn}$ ,  $\operatorname{dn}$ , and the elliptic integrals, the second part with the Weierstrassian forms  $\wp u$ ,  $\zeta u$ ,  $\sigma u$ , and the third part with the general properties of elliptic functions and their applications to the Jacobian and Weierstrassian forms.

In the fourth and last part, the  $\theta$ -functions are considered.

As may be expected from the announcement in the preface, the book does not contain anything beyond well known elementary propositions. In view of possible applications, of which the book does not contain any, particular attention is given to the construction of formulas for numerical computations.

The reviewer must confess that he would have expected a course of lectures on elliptic functions at the University Paris planned from a higher point of view, as is customary at that famous center of mathematical activity. For this reason the Leçons, in spite of their excellence of execution and typography, are disappointing.

ARNOLD EMCH.

#### NOTES.

THE April number (volume 41, number 2) of the *American Journal of Mathematics* contains the following papers: "Asymptotic satellites near the straight-line equilibrium points in the problem of three bodies," by DANIEL BUCHANAN; "Concerning the invariant theory of involutions of conics," by WAYNE SENSENIG; "Note on seminvariants of systems of partial differential equations," by A. L. NELSON; "On a method for determining the non-stationary state of heat in an ellipsoid," by BIBHUTIBHUSAN DATTA; "Nilpotent algebras generated by two units,  $i$  and  $j$ , such that  $i^2$  is not an independent unit," by G. W. SMITH.

THE Circolo matematico di Palermo announces that it has resumed the publication of its *Rendiconti*. Contributors are invited to submit manuscripts to its committee of publication under the usual conditions.