L'Arithmétique de l'Infini. By Maurice Fréchet. Paris, Hermann et Cie, 1934. 38 pp.

Propriétés des Espaces Abstraits les plus Généraux. Ensembles Ouverts, Fermés, Denses en soi, Clairsemés. Connexion. By Antoine Appert. Paris, Hermann et Cie, 1934. xi+54 pp.

Propriétés des Espaces Abstraits les plus Généraux. Compacité, séparabilité, Transformations et Fonctionelles. By Antoine Appert. Paris, Hermann et Cie, 1934. 55 pp.

These books are numbers 144–146 of the Actualités Scientifiques et Industrielles and form the first three volumes of a series, edited by M. Fréchet, with the title: *Exposés d'Analyse Générale.*

The first volume is intended to give a simple introduction to that part of the theory of transfinite cardinal and ordinal numbers necessary for the understanding of the later volumes. As a consequence, the Zermelo postulate is ignored, the operations of addition and multiplication of transfinite numbers are not defined, and the discussion is restricted to the cardinal numbers $\aleph_0$ and c and to the ordinal numbers of the first and second classes. The latter are defined as the ordinal numbers of well-ordered sets of increasing rational numbers. The treatment is intuitive and few proofs are given. There is a short chapter on operations on sets as well as one on measure and integration, the treatment in the latter being that of W. H. Young. The list of references is short but adequate.

The second volume develops the concepts listed in its sub-title for the very general case of spaces in which the operation of derivation can be defined by means of neighborhoods. Particular attention is paid to the case in which the neighborhoods can be chosen as open sets and a chapter is devoted to the comparison of this condition with the requirement that the derived sets be closed. This, and a chapter on the distributive property of the operation of derivation, completes the discussion of the properties usually thought of as postulates. The various separation postulates are not needed in the development and are scarcely mentioned. There is a short chapter on self-dense and clairsemé sets and a much longer one on connectedness.

The third volume is a continuation of the second. In the first of three chapters various degrees of compactness are defined and the corresponding covering- and product-theorems are proved. In the second chapter a natural extension of the notions of separability and perfect separability is made which leads to generalizations of the theorems of Lindelöf and Cantor-Bendixson. The final chapter deals with continuous transformations and, in particular, with functionals. Semi-continuity of functionals is defined and the relation between the boundedness of functionals having this property and the compactness of their domain of definition is discussed.

These books should form an excellent introduction to the theory of abstract spaces. Dr. Appert has done a good job of exposition, the only "fault" found by the reviewer being that the proofs are frequently given in too much detail. There are a number of interesting examples.

H. E. Vaughan