Algebraic Theory of Measure and Integration, by C. Carathéodory. Chelsea Publishing Company, New York, N.Y., 1963. 378 pages.

The book under review is a translation into English of the book: "Mass und Integral und Ihre Algebraisierung" by C. Carathéodory.

In short the book consists of a theory of measure and integration in a non-atomic setting in terms of the algebraic properties of Boolean τ-rings. The analogue of the theory of measure for Boolean algebras was developed earlier by A. Tarski and others. Carathéodory's discovery, however, that an analogue of the classical concept of a point function could be given in the theory of Boolean rings, made it possible for him to give an algebraic treatment of the theory of integration in the theory of Boolean rings. Since 1938, Carathéodory wrote seven fundamental papers on this subject which are listed at the end of the book.

The translator pointed by remarks in his preface to the book that the representation theorem of Loomis and Sikorski for Boolean τ-rings clearly indicates that Carathéodory's generalization of the classical theory is not so great as one might think at first. The importance of the present book must be found particularly in the fact that it gives an added insight in the algebraic structure of the theory of integration.

The first two chapters, entitled "Somas" and "Sets of Somas" respectively, consist essentially of an elementary treatment of the concepts of a Boolean algebra and a Boolean ring. The elements of a Boolean algebra are called somas by Carathéodory analogously to the usage of calling the elements of an abstract set points.

"Place Functions" and "Calculation with Place Functions" are the titles of Chapter three and four respectively. To every real function f defined on a set X there corresponds a spectral family of subsets of X in the following way: $F(t) = \{x: x \in X \text{ and } f(x) < t\}$, $t \in R$, where R denotes the real number system, which in a sense determines f. On the basis of this observation, Carathéodory considers the set of all order-preserving mappings of R into a Boolean ring, and which are called rays. If S and T are two rays, then Carathéodory defines $S \leq T$ if and only if for every pair of real numbers $y, z \in R$, $y < z$ implies $S(y) \subseteq T(z)$. This relation preorders the set of all rays. Then the elements of the set of all classes of equivalent elements defined by the equivalence relation $S \sim T$ if and only if $S \leq T$ and $T \leq S$ are called place functions.

Chapter five, entitled "Measure Functions", deals with measure theory on sets of somas. In Chapter six, "The Integral", the theory of integration for place functions is developed. First the integral is defined for a finitely-valued place function (abstract analogue of the notion of a step function) and is then extended to a larger family of place functions.

"Application of the Theory of Integration to Limit Processes" is the title of Chapter seven. In this chapter the reader will find the analogues of Egeroff's theorem, mean convergence, and Birkhoff's ergodic theorem. The latter subject should be of particular interest to the reader.

Chapters eight, nine and ten, entitled "The Computation of Measure Functions", "Regular Measure Functions" and "Isotypic Regular Measure Functions" respectively, deal with the study of measure functions (exterior measures) generated by weight functions. Measure functions generated by countably-additive and non-negative weight functions are called regular and are studied in detail. Inner measures are introduced and an interesting result concerning the arithmetic mean of a regular measure function and its corresponding inner measure is given.

The Jordan decomposition theorem and the Radon-Nikodym theorem are treated in Chapter ten entitled "Isotypic Regular Measure Functions".

Chapter eleven, entitled "Content Functions", deals with the theory of integration in finite-dimensional Euclidean spaces. Among other things the reader will find in this chapter a treatment of the Vitali covering theorem, the Lebesgue integral and an introduction to the theory of linear measures. Linear measures are determined by those measure functions which are generated by the diameter set function.

The book concludes with an appendix on the theory of partially ordered sets.

A list of symbols and an extensive index are included.

The translation is excellent and we may be thankful to the translator and the publisher for their effort to make this important book available in English.

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Algorithmes et Machines à Calculer, by B. A. Trahtenbrot. Translated from the second Russian edition (1960) by A. Chauvin. Dunod, Paris, 1963. xii + 149 pages.

This book is a pleasant popular account of the basic concepts and results of the modern theory of computability. The reader is introduced to the theory by considering successively: algorithms from number theory; winning strategies in two-person games of skill; labyrinth problems; and special cases of the word problem. An interesting feature is a proof that in games such as chess at least one of the