

at home with new ideas, and when they are wisely chosen they can exhibit the variety that exists in a subject and suggest new lines of thought. Even simpler problems are not to be despised, for it is not a base thing to get pleasure from manipulating a problem into a practicable answer. One can never be sure that the most uncompromising devotee of existence theorems does not some times seek amusement in such indulgence.

All persons who have given any attention at all to difference equations must hope that the subject will find an appropriate place in the mathematical structure. It would seem that extensive treatises on analysis should devote some space to it, at least to the extent of treating the gamma function in a way different from the traditional one, and going a little beyond the gamma function. It is to be hoped that the material in Batchelder's book may help to make such treatments possible as well as stimulate further study of the subject.

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HELLINGER-TOEPLITZ ON INTEGRAL EQUATIONS

Integralgleichungen und Gleichungen mit unendlichvielen Unbekannten. By E. Hellinger and O. Toeplitz. Reprint from the *Encyclopädie der Mathematischen Wissenschaften* with the addition of a preface by E. Hilb and of a special subject-index. Leipzig-Berlin, Teubner, 1928. Pp. 1335-1616.

In his preface Hilb points out that the book under review appears after a quarter of a century of research in the field of the theory of integral equations. It must be considered, therefore, as a survey of results obtained, and as an account of problems which remain still unsolved. "During several years of cooperative work the authors scrutinized the whole literature as to methods, results and their comparative range." We agree with Hilb that this "Report is indispensable to anybody who desires to penetrate deeply into this subject so extraordinarily important for its applications." An attentive reader, even well versed in the subject, will find many novel features in treating old and new questions, features which are extremely illuminating and inspiring; he will welcome the successful efforts of the authors to unify the multitude of existing methods and to present these methods as parts of a harmonious whole. As notable instances of this kind we may mention the treatment of completely continuous forms (pp. 1403-1413); of normal matrices (p. 1562; this seems to be a new notion introduced by the authors and proving to be quite useful in a number of recent investigations); of symmetrizable kernels (pp. 1536-1543) and matrices (pp. 1563-1575); of a general principle which could be designated as a "principle of preservation of the type" of kernels or matrices (pp. 1391-1392, 1431-1433). It is undoubtedly a good idea (although a departure from the usual style of the *Encyclopädie*) to give *proofs* of some facts of fundamental importance; the reader will be also pleasantly surprised to find references to some *facts not previously published* (Toeplitz, p. 1573; Toeplitz-Schmidt, p. 1575; Szász, p. 1522). It is hardly necessary to mention that the bibliography of the Report is extremely rich and shows that the authors have canvassed