BOOK REVIEWS

Linear analysis. By A. C. Zaanen. New York, Interscience; Amsterdam, North-Holland; Groningen, Noordhoff, 1953. 7+600 pp. $11.00.

This book goes a long way (but not all the way) toward filling the gap in the mathematical literature caused by the fact that Banach's book has been out of date for several years. The book is divided into three parts: measure theory, operator theory, and integral equations. The overlap with the material in Banach's book is, of course, in the second part, which is the longest and most important one.

The writing is clear and well organized; the author is an excellent expositor. A conspicuous and pleasing feature is the quality and quantity of examples. Not only is there an adequate supply of exercises at the end of each chapter, but throughout the body of the book there are many detailed discussions of standard and non-standard examples: sequence spaces, the Orlicz generalization of L_p spaces, sequential transformations, integral kernels, etc. There is some emphasis, but not a disproportionate amount, on the author's own work on symmetrisable transformations and kernels.

Hilbert spaces receive much more attention here than in Banach, but the treatment is more from the point of view of Banach spaces than would be the case in a book devoted to Hilbert space. The spectral theorem is not proved.

An unusual aspect of the book is the author's explicitly stated desire to avoid use of the well-ordering theorem, because of its "controversial" nature. This, apparently, is not done in the intuitionistic spirit; the author's proofs are like all ordinary mathematical proofs, and, in particular, they make free use of the principle of excluded middle. The axiom of choice, at least for countably many choices from arbitrarily large sets, is used, more or less explicitly, several times.

As a consequence of the avoidance of transfinite methods, many standard theorems appear in the book either for separable spaces only, or else accompanied by the *assumption* of the validity of the Hahn-Banach extension theorem. Presumably as a further consequence of the same philosophy, weak *convergence* is systematically preferred to weak *topology*, and, for instance, the Tychonoff-Alaoglu theorem on the weak compactness of the unit sphere in a conjugate space appears in its sequential form only.

A fair idea of the material covered can be obtained from the titles