BOOKS ON FOURIER SERIES

The Theory of Functions of a Real Variable and the Theory of Fourier's Series. By E. W. Hobson. Second edition, revised throughout and enlarged. Vol. 1. Cambridge, the University Press, 1921. xv + 671 pp.

Introduction to the Theory of Fourier's Series and Integrals. By H. S. Carslaw. Second edition, completely revised. London, Macmillan and Company, 1921. xi + 323 pp.

The study of Fourier's series has exercised a profound influence upon the development of the theory of functions of a real variable.* Any one familiar with this influence and with the close relationship, both historical and inherent, between the two theories, will not be surprised that the two treatises mentioned above should have a considerable number of points in common. He will also not be surprised that in each case the plan of writing such a work had its origin in the study of Fourier's series in connection with their applications to problems of mathematical physics. The points of difference in scope and content between the two books are due in the main to the difference in the ultimate aim of the two writers. Professor Carslaw decided to write a book primarily for the worker in applied mathematics who has occasion to make use of Fourier's series and integrals; Professor Hobson elected to meet the needs of the pure mathematician whose work deals directly or indirectly with functions of a real variable.

A casual glance at the table of contents of Carslaw's work, however, will convince the informed reader that the needs of the pure mathematician of one generation are very apt to become the needs of the applied mathematician of the next generation. It is not so long ago that it would have been considered very unorthodox to include such topics as a discussion of Dedekind's theory of irrational numbers, the nature of uniform and non-uniform convergence, and a fairly complete treatment of the Riemann integral in a book intended for the applied mathematician. So, if the reviewer admits that Hobson's book is mainly for the pure mathematician, he does it with the mental reservation that the statement applies only to the present time and the immediate future. He does not agree with the implications contained in Hobson's statement on page 432 that the Riemann integral "will continue to be the basis upon which the practical applications of the Integral Calculus rest", but thinks it quite likely that at some future time, more or less distant, certain workers in applied mathematics may find their center of interest transferred from the Riemann integral to the Lebesgue integral, or some other integral still more general, just as at the present time some of those pursuing applied mathematics have found it desirable to change from a basis of euclidean geometry to a basis of non-euclidean geometry.

* Cf. E. B. Van Vleck, *The influence of Fourier's series upon the development of mathematics*, SCIENCE, new ser., vol. 39 (1914).