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Johnston, William
The Lebesgue integral for undergraduates.
MAA Textbooks. Washington, DC: The Mathematical Association of America (MAA) (ISBN 978-1-93951-207-9/hbk; 978-1-61444-620-0/ebook). xi, 284 p. (2015).

As the author states in the preface, "this book presents the Lebesgue integral at an understandable level with almost no prerequisites. The text is accessible to anyone who has mastered the single-variable calculus concepts of limits, derivatives, and series". To this aim, the Daniell-Riesz approach is extensively used. It is presented in Chapter 1 together with basic concepts such as countable and uncountable infinities, limits of sequences, and continuity. In Chapter 2, the Lebesgue integral is compared to the Riemann integral, with an application to Fourier series. Chapter 3 presents the function spaces L^p, with an application to quantum mechanics. The Lebesgues measure is constructed in Chapter 4 starting from the Lebesgue integral. A brief excursion into probability is provided. Chapter 5 is devoted to Hilbert space operators, with an application to a spectral theorem. The book includes questions, reading questions, and about 700 exercises with solutions to the odd-numbered ones. There are also historical vignettes and many stories of great mathematicians. This text incorporates the author's extensive teaching experience. After presenting Lebesgue's integral and some of its applications, the book invites undergraduate students to further study.

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Classification: I55
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