

# *Introduction to Real Analysis*

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*Eduardo Piza*



*Mnemosyne*

This treatise is devoted to the study of fundamental topics in real analysis of functions of a single variable. It covers, among other subjects, the limited development of real functions, the theory of sequences and numerical series, Riemann integration—both proper and improper—integration techniques, the theory of series of functions, power series, as well as topics such as uniform convergence, convergence in the quadratic mean, and equicontinuity.

Engaging with this work requires prior knowledge of the continuity and differentiability of real functions, as well as a solid understanding of fundamental concepts concerning the structure of the real numbers, such as the Completeness Axiom and its related principles and consequences.

The book offers a rigorous exposition of the theory, complemented by a wide selection of exercises for each topic. It also includes brief biographies of notable mathematicians who contributed to the development of these theories, accompanied by illustrations. This work has been used on multiple occasions as a textbook for introductory courses in real analysis within the Pure Mathematics and Mathematics Education programs at the University of Costa Rica, and it has also been partially adopted in advanced calculus courses for Engineering and Computer Science programs.



Eduardo Piza is a Costa Rican mathematician and was the national chess champion in 1982. Author of twenty-six books—including works on mathematics, chess treatises, and various literary texts—and numerous scientific articles, he dedicated nearly four decades to teaching and research at the University of Costa Rica. Now retired, he continues to write with the same passion that once guided him through the paths of algebra, strategy, and memory.

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# Introduction to Real Analysis (First courses of Mathematical Analysis)

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Book 2 of 2: First courses of Mathematical Analysis

This treatise is dedicated to the study of fundamental topics in real mathematical analysis in one variable. It covers, among other subjects, the limited development of real functions, the theory of sequences and numerical series, Riemann integration (both proper and improper), integration techniques, the theory of series of functions, power series, as well as topics on uniform convergence, quadratic mean convergence, and equicontinuity.

To engage with this work, prior knowledge of the continuity and differentiability of real functions is required, along with fundamental concepts related to the structural properties of real numbers, such as the Completeness Principle and its analogs and consequences.

The book presents a rigorous exposition of the theory, complemented by a wide selection of exercises for each topic. It also includes biographies of notable mathematicians who contributed to the development of these theories, accompanied by illustrations. This work has been used on multiple occasions as a textbook in introductory mathematical analysis courses in the Pure Mathematics and Mathematics Education programs at the University of Costa Rica, and it has also been partially employed in advanced calculus courses for Engineering and Computer Science programs.

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