Introduction to Integral Calculus: Systematic Studies with Engineering Applications for Beginners

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This book explores the integral calculus and its plentiful applications in engineering and the physical sciences. The authors aim to develop a basic understanding of integral calculus combined with scientific problems, and throughout, the book details the numerous applications of calculus as well as presents the topic as a deep, rich, intellectual achievement. The needed fundamental information is presented in addition to plentiful references, exercises, and examples. The definition of an integral is motivated by the familiar notion of area. Although the methods of plane geometry allow for the areas of polygons to be calculated, they do not provide ways of finding the area of plane regions whose boundaries are curves other than circles. By means of the integral, the areas of many such regions can be found. The authors also use this definition to calculate volumes and length of curves etc. Topical coverage includes anti-differentiation; integration of trigonometric functions; integration by substitution; methods of substitution; the definite integral; methods for evaluating definite integrals; differential equations and their solutions; and ordinary differential equations of first order and first degree.