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Title: Calculus 2nd Edition
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The main topics of this book are the standard calculus curriculum defined for the last three decades. The contents are structured into two parts, one involves functions for one variable and the other involves functions of several variables. These two parts are carefully arranged in 14 chapters with the addition of Chapter 0 devoted to some preliminary ideas such as the real numbers and the Cartesian plane, some basic methods of approximating zeros, and some important functions frequently required in a calculus course.

This text has a number of distinctive features. First, each chapter begins with a brief description of applications related to the mathematical concepts central to the chapter. Second, guidance on the proper use of a mathematical concept is given. Third, notes providing historical information of the development of a particular concept. In addition the text is equipped with numerous worked examples, exploring concepts and physical applications. The text is particularly suitable to junior mathematics and science undergraduate students.

Chapter One gives many examples of limits of functions before a formal definition is provided. Through these worked examples students will be able to learn various techniques of evaluating limits. The chapter ends with an introduction of rounding-off errors due to computational devices.

Chapter Two introduces the idea of average tangent through the physical concept of velocity or speed before giving a formal definition of the derivative of a given function. Numerous examples of obtaining derivatives are provided and rules of finding derivatives are proved using the formal definition. The important concept of the mean value theorem is introduced in the last section of this chapter.

Chapter Three examines a number of key applications of differentiation. L'Hôpital rule is introduced as the linear approximation of the tangent line at a certain origin and Newton's method is introduced in a similar way. Simple optimisation of functions of one variable, local extreme and concavity are discussed with applications to curve sketching.

Chapter Four introduces the concept of integration. Various rules for integration of indefinite integrals are developed by using anti-derivative concepts of some known functions. The sums and sigma notation are introduced to compute the sum of function values which leads to the Riemann sum for the computing of the area under the function defined on a closed interval. Through the use of Riemann sum the definite integral of a function defined on a closed interval may be evaluated. The fundamental theorem of calculus is proved by using the concept of a Riemann sum and leads to a practical method of evaluating definite integrals. The chapter ends with some harder examples of integration.

Chapter Five gives some applications of the definite integral, including areas between curves, volumes from cross-sectional areas, volumes by cylindrical shells, arc length and surface area, projectile motion, and some classical mechanics problems. This chapter finishes with a brief introduction to the use of calculus in probability theory.

Chapter Six is a re-visit to the natural logarithm and the exponential function, of which many science and engineering problems involve the use of these two functions. The concept of a separable differential equation is introduced to solve first order differential equations. The chapter is also supplemented with some numerical methods for first order equation, including Euler's method and improved Euler's method. Inverse functions and the calculus of inverse functions are examined.

Chapter Seven is a collection of integration techniques such as integration by parts, reduction formula, partial fractions, etc. Further techniques of evaluating limits of indeterminate forms and improper integrals are also included.

Chapters Eight and Nine gives further tools related to functions of one variable, including a concise introduction to infinite series, convergence tests, alternative description of curves using parametric forms and polar coordinates. The section on infinite series is particular useful and includes alternating series, power series, Taylor series and Fourier series.

Chapters Ten and Eleven provide basic concepts of vectors and the geometry of spaces and develops the calculus of vector-valued functions. Such concepts are frequently explained with the aid of mechanics problems as well as multi-colour three-dimensional diagrams.

Chapters Twelve and Thirteen presents the calculus of functions of several variables and introduces double and triple integrals. Concepts of limits and partial derivatives are introduced using functions of two variables for simplicity. Understanding the gradient and directional derivatives is important, and many worked examples are provided in the text to aid the understanding. These techniques are applied to search for the extrema of functions of several variables.

Chapter Fourteen gives a brief introduction to vector calculus, which is particularly important in various fluid mechanics applications, electricity and magnetism. The multi-colour diagrams used in this chapter is particular helpful to understand concepts, such as curl and divergence, and methods in three dimensional problems.

Finally each chapter has a chapter review exercise. This reviewer finds that the exercises are particularly useful for students to recall various concepts and methods developed in the chapter. Answers are provided for odd number questions in each chapter, and 3-D diagrams and graphs are also given as reference solutions.