PREFACE

Calculus is one of the milestones of Western thought. Building on ideas of Archimedes, Fermat, Newton, Leibniz, Cauchy, and many others, the calculus is arguably the cornerstone of modern science. Any well-educated person should at least be acquainted with the ideas of calculus, and a scientifically literate person must know calculus solidly.

Calculus has two main aspects: differential calculus and integral calculus. Differential calculus concerns itself with rates of change. Various types of change, both mathematical and physical, are described by a mathematical quantity called the *derivative*. Integral calculus is concerned with a generalized type of addition, or amalgamation, of quantities. Many kinds of summation, both mathematical and physical, are described by a mathematical quantity called the *integral*.

What makes the subject of calculus truly powerful and seminal is the Fundamental Theorem of Calculus, which shows how an integral may be calculated by using the theory of the derivative. The Fundamental Theorem enables a number of important conceptual breakthroughs and calculational techniques. It makes the subject of differential equations possible (in the sense that it gives us ways to *solve* these equations).

Calculus Demystified explains this panorama of ideas in a step-by-step and accessible manner. The author, a renowned teacher and expositor, has a strong sense of the level of the students who will read this book, their backgrounds and their strengths, and can present the material in accessible morsels that the student can study on his own. Well-chosen examples and cognate exercises will reinforce the ideas being presented. Frequent review, assessment, and application of the ideas will help students to retain and to internalize all the important concepts of calculus.

We envision a book that will give the student a firm grounding in calculus. The student who has mastered this book will be able to go on to study physics, engineering, chemistry, computational biology, computer science, and other basic scientific areas that use calculus.

Calculus Demystified will be a valuable addition to the self-help literature. Written by an accomplished and experienced teacher (the author of *How to Teach Mathematics*), this book will aid the student who is working without a teacher.

It will provide encouragement and reinforcement as needed, and diagnostic exercises will help the student to measure his or her progress. A comprehensive exam at the end of the book will help the student to assess his mastery of the subject, and will point to areas that require further work.

We expect this book to be the cornerstone of a series of elementary mathematics books of the same tenor and utility.

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