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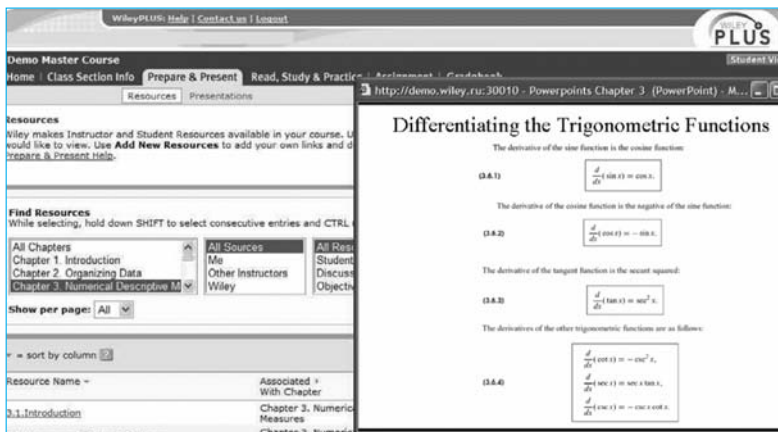
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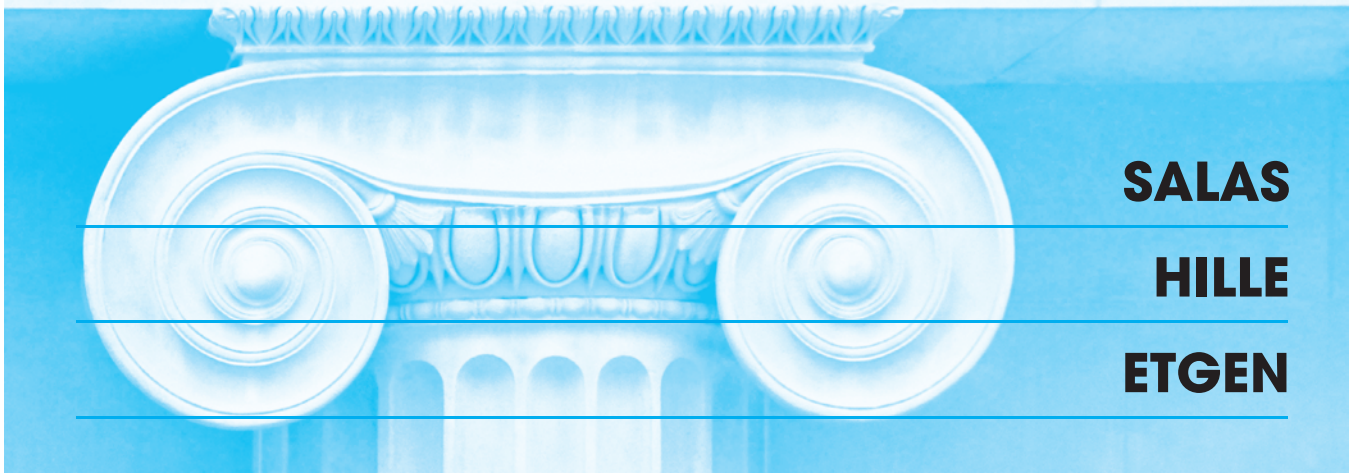
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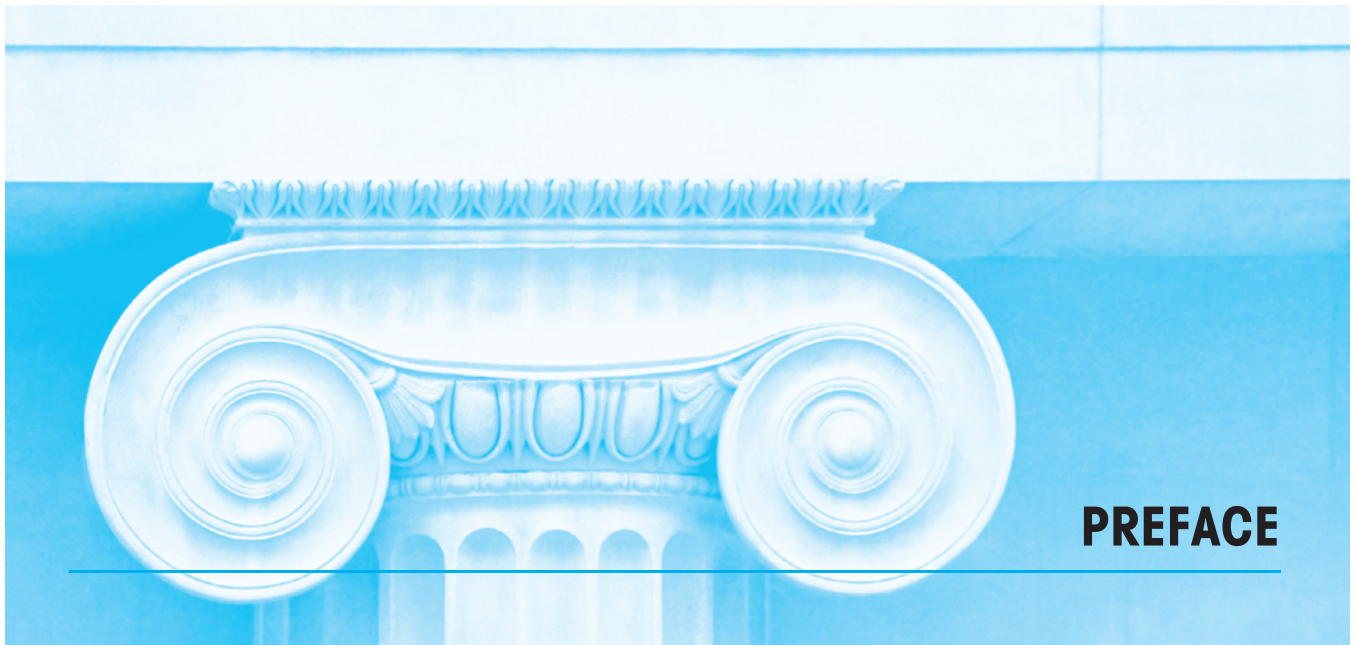
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This text is devoted to the study of single and multivariable calculus. While applications from the sciences, engineering, and economics are often used to motivate or illustrate mathematical ideas, the emphasis is on the three basic concepts of calculus: limit, derivative, and integral.

This edition is the result of a collaborative effort with S.L. Salas, who scrutinized every sentence for possible improvement in precision and readability. His gift for writing and his uncompromising standards of mathematical accuracy and clarity illuminate the beauty of the subject while increasing its accessibility to students. It has been a pleasure for me to work with him.

FEATURES OF THE TENTH EDITION

Precision and Clarity

The emphasis is on mathematical exposition; the topics are treated in a clear and understandable manner. Mathematical statements are careful and precise; the basic concepts and important points are not obscured by excess verbiage.

Balance of Theory and Applications

Problems drawn from the physical sciences are often used to introduce basic concepts in calculus. In turn, the concepts and methods of calculus are applied to a variety of problems in the sciences, engineering, business, and the social sciences through text examples and exercises. Because the presentation is flexible, instructors can vary the balance of theory and applications according to the needs of their students.

Accessibility

This text is designed to be completely accessible to the beginning calculus student without sacrificing appropriate mathematical rigor. The important theorems are explained

and proved, and the mathematical techniques are justified. These may be covered or omitted according to the theoretical level desired in the course.

Visualization

The importance of visualization cannot be over-emphasized in developing students' understanding of mathematical concepts. For that reason, over 1200 illustrations accompany the text examples and exercise sets.

Technology

The technology component of the text has been strengthened by revising existing exercises and by developing new exercises. Well over half of the exercise sets have problems requiring either a graphing utility or a computer algebra system (CAS). Technology exercises are designed to illustrate or expand upon the material developed within the sections.

Projects

Projects with an emphasis on problem solving offer students the opportunity to investigate a variety of special topics that supplement the text material. The projects typically require an approach that involves both theory and applications, including the use of technology. Many of the projects are suitable for group-learning activities.

Early Coverage of Differential Equations

Differential equations are formally introduced in Chapter 7 in connection with applications to exponential growth and decay. First-order linear equations, separable equations, and second linear equations with constant coefficients, plus a variety of applications, are treated in a separate chapter immediately following the techniques of integration material in Chapter 8.

CHANGES IN CONTENT AND ORGANIZATION

In our effort to produce an even more effective text, we consulted with the users of the Ninth Edition and with other calculus instructors. Our primary goals in preparing the Tenth Edition were the following:

- 1. Improve the exposition.** As noted above, every topic has been examined for possible improvement in the clarity and accuracy of its presentation. Essentially every section in the text underwent some revision; a number of sections and subsections were completely rewritten.
- 2. Improve the illustrative examples.** Many of the existing examples have been modified to enhance students' understanding of the material. New examples have been added to sections that were rewritten or substantially revised.
- 3. Revise the exercise sets.** Every exercise set was examined for balance between drill problems, midlevel problems, and more challenging applications and conceptual problems. In many instances, the number of routine problems was reduced and new midlevel to challenging problems were added.

Specific changes made to achieve these goals and meet the needs of today's students and instructors include:

Comprehensive Chapter-End Review Exercise Sets

The Skill Mastery Review Exercise Sets introduced in the Ninth Edition have been expanded into chapter-end exercise sets. Each chapter concludes with a comprehensive set of problems designed to test and to re-enforce students' understanding of basic concepts and methods developed within the chapter. These review exercise sets average over 50 problems per set.

Precalculus Review (Chapter 1)

The content of this chapter—inequalities, basic analytic geometry, the function concept and the elementary functions—is unchanged. However, much of the material has been rewritten and simplified.

Limits (Chapter 2)

The approach to limits is unchanged, but many of the explanations have been revised. The illustrative examples throughout the chapter have been modified, and new examples have been added.

Differentiation and Applications (Chapters 3 and 4)

There are some significant changes in the organization of this material. Realizing that our treatments of linear motion, rates of change per unit time, and the Newton-Raphson method depended on an understanding of increasing/decreasing functions and the concavity of graphs, we moved these topics from Chapter 3 (the derivative) to Chapter 4 (applications of the derivative). Thus, Chapter 3 is now a shorter chapter which focuses solely on the derivative and the processes of differentiation, and Chapter 4 is expanded to encompass all of the standard applications of the derivative—curve-sketching, optimization, linear motion, rates of change, and approximation. As in all previous editions, Chapter 4 begins with the mean-value theorem as the theoretical basis for all the applications.

Integration and Applications (Chapters 5 and 6)

In a brief introductory section, area and distance are used to motivate the definite integral in Chapter 5. While the definition of the definite integral is based on upper and lower sums, the connection with Riemann sums is also given. Explanations, examples, and exercises throughout Chapters 5 and 6 have been modified, but the content and organization remain as in the Ninth Edition.

The Transcendental Functions, Techniques of Integration (Chapters 7 and 8)

The coverage of the inverse trigonometric functions (Chapter 7) has been reduced slightly. The treatment of powers of the trigonometric functions (Chapter 8) has been completely rewritten. The optional sections on first-order linear differential equations and separable differential equations have been moved to Chapter 9, the new chapter on differential equations.

Some Differential Equations (Chapter 9)

This new chapter is a brief introduction to differential equations and their applications. In addition to the coverage of first-order linear equations and separable equations noted

above, we have moved the section on second-order linear homogeneous equations with constant coefficients from the Ninth Edition's Chapter 18 to this chapter.

Sequences and Series (Chapters 11 and 12)

Efforts were made to reduce the overall length of these chapters through rewriting and eliminating peripheral material. Eliminating extraneous problems reduced several exercise sets. Some notations and terminology have been modified to be consistent with common usage.

Vectors and Vector Calculus (Chapters 13 and 14)

The introduction to vectors in three-dimensional space has been completely rewritten and reduced from two sections to one. The parallel discussion of vectors in two- and three-dimensional space has been eliminated—the primary focus is on three-dimensional space. The treatments of the dot product, the cross product, lines and planes in Chapter 13, and vector calculus in Chapter 14 are unchanged.

Functions of Several Variables, Gradients, Extreme Values (Chapters 15 and 16); Multiple Integrals, Line and Surface Integrals (Chapters 16 and 17)

The basic content and organization of the material in these four chapters remain as in the ninth edition. Improvements have been made in the exposition, examples, illustrations, and exercises.

Differential Equations (Chapter 19)

This chapter continues the study of differential equations begun in Chapter 9. The sections on Bernoulli, homogeneous and exact equations have been rewritten, and elementary numerical methods are now covered in a separate section. The section on second-order linear nonhomogeneous equations picks up from the treatment of linear homogeneous equations in the new Chapter 9. The applications section—vibrating mechanical systems—is unchanged.

SUPPLEMENTS

An Instructor's Solutions Manual, ISBN 0470127309, includes solutions for all problems in the text.

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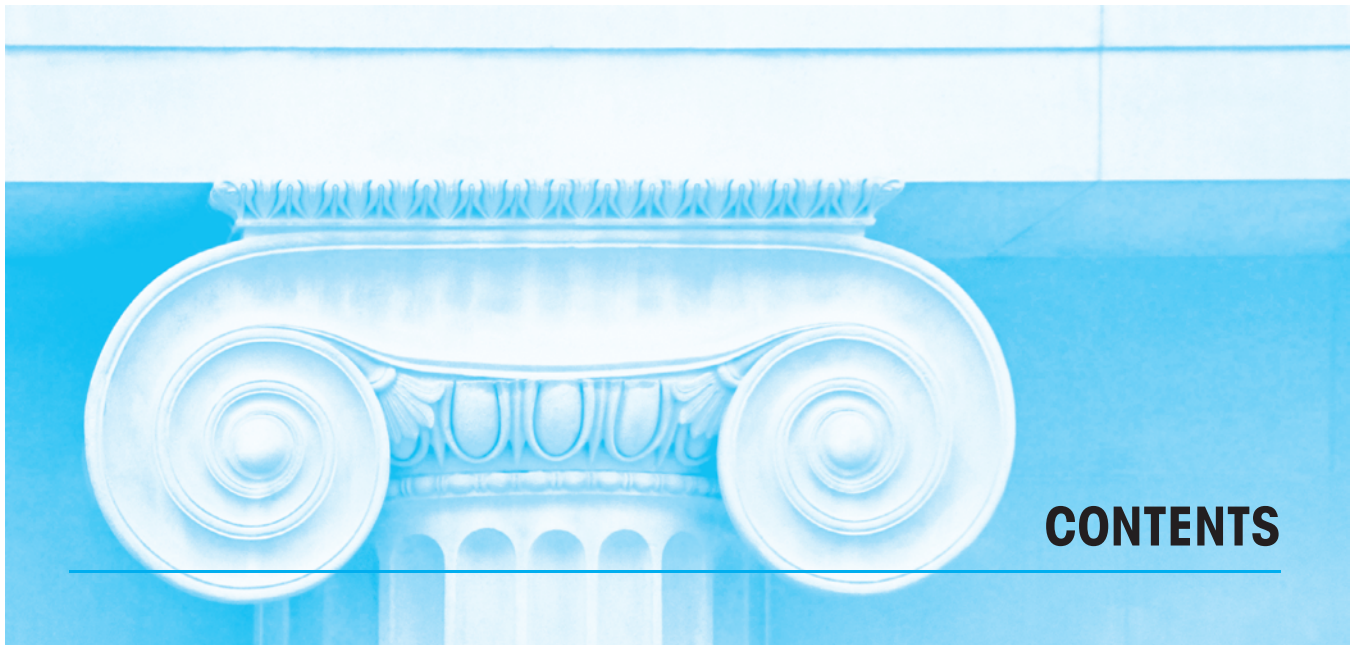
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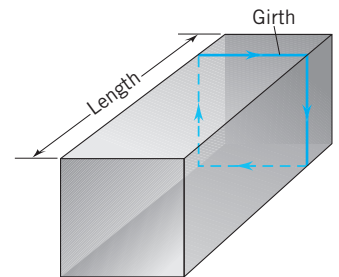
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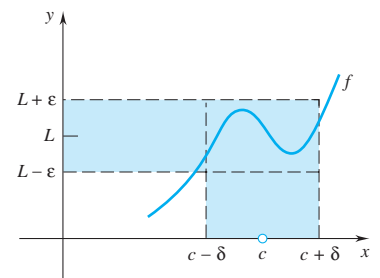
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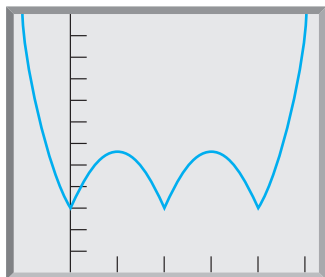


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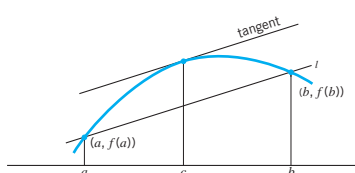




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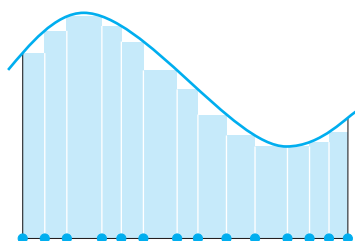
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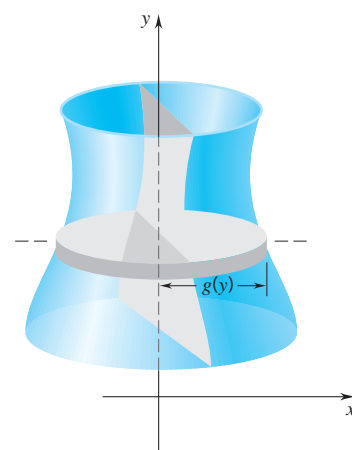
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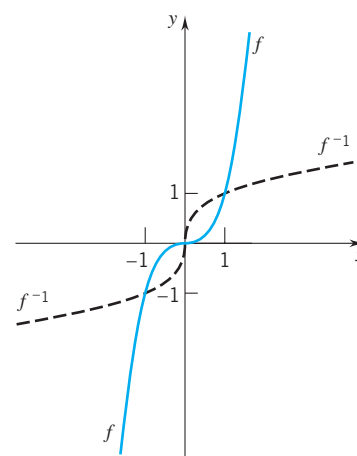
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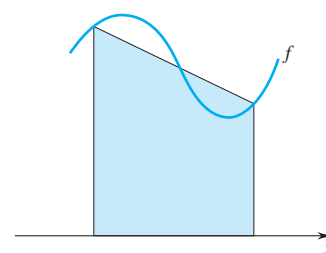
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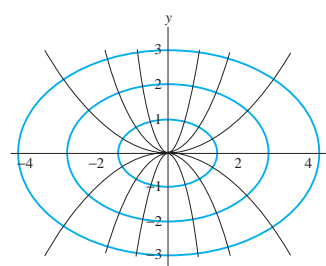
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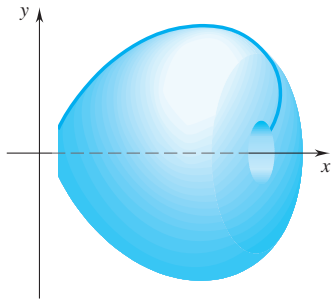
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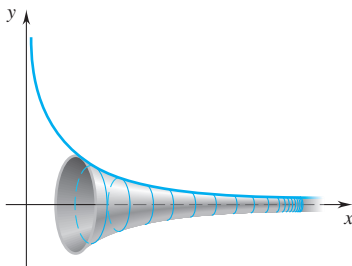
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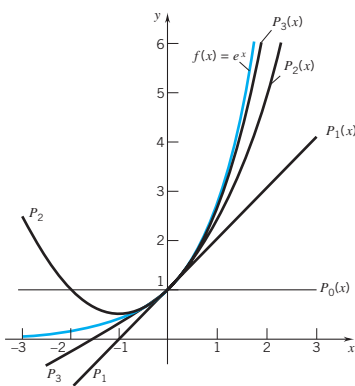
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