



James Stewart

# Essential Calculus

EARLY TRANSCENDENTALS

Second Edition

Tailieu.vn



Use this QR code for a shortcut  
to [stewartcalculus.com](http://stewartcalculus.com)



Now that you have the book, enhance it with these  
free online resources at [stewartcalculus.com](http://stewartcalculus.com):

- Review of Algebra, Analytic Geometry, and Conic Sections
- Homework Hints
- Additional Examples
- Additional Topics
- Computer Animations
- Lies My Calculator and Computer Told Me
- Challenge Problems
- Projects
- And much more...

## WEB PROJECTS

These projects can be completed anytime after you have studied the corresponding section in the textbook. To select a project, go to [www.stewartcalculus.com](http://www.stewartcalculus.com) and click on **PROJECTS**.

### 2 DERIVATIVES

- 2.1 WRITING PROJECT ■ Early Methods for Finding Tangents
- 2.3 APPLIED PROJECT ■ Building a Better Roller Coaster
- 2.5 APPLIED PROJECT ■ Where Should a Pilot Start Descent?
- 2.6 LABORATORY PROJECT ■ Families of Implicit Curves
- 2.8 LABORATORY PROJECT ■ Taylor Polynomials

### 3 INVERSE FUNCTIONS

- 3.7 WRITING PROJECT ■ The Origins of L'Hospital's Rule

### 4 APPLICATIONS OF DIFFERENTIATION

- 4.1 APPLIED PROJECT ■ The Calculus of Rainbows
- 4.5 APPLIED PROJECT ■ The Shape of a Can

### 5 INTEGRALS

- 5.3 DISCOVERY PROJECT ■ Area Functions
- 5.4 WRITING PROJECT ■ Newton, Leibniz, and the Invention of Calculus
- APPLIED PROJECT ■ Where To Sit at the Movies

### 6 TECHNIQUES OF INTEGRATION

- 6.4 DISCOVERY PROJECT ■ Patterns in Integrals

### 7 APPLICATIONS OF INTEGRATION

- 7.1 APPLIED PROJECT ■ The Gini Index
- 7.2 DISCOVERY PROJECT ■ Rotating on a Slant
- 7.4 DISCOVERY PROJECT ■ Arc Length Contest
- 7.5 APPLIED PROJECT ■ Calculus and Baseball
- 7.6 APPLIED PROJECT ■ How Fast Does a Tank Drain?
- APPLIED PROJECT ■ Which Is Faster, Going Up or Coming Down?

### 8 SERIES

- 8.1 LABORATORY PROJECT ■ Logistic Sequences
- 8.7 LABORATORY PROJECT ■ An Elusive Limit
- WRITING PROJECT ■ How Newton Discovered the Binomial Series
- 8.8 APPLIED PROJECT ■ Radiation from the Stars

### 9 PARAMETRIC EQUATIONS AND POLAR COORDINATES

- 9.1 LABORATORY PROJECT ■ Running Circles Around Circles
- 9.2 LABORATORY PROJECT ■ Bézier Curves
- 9.3 LABORATORY PROJECT ■ Families of Polar Curves

### 10 VECTORS AND THE GEOMETRY OF SPACE

- 10.4 DISCOVERY PROJECT ■ The Geometry of a Tetrahedron
- 10.5 LABORATORY PROJECT ■ Putting 3D in Perspective
- 10.9 APPLIED PROJECT ■ Kepler's Laws

### 11 PARTIAL DERIVATIVES

- 11.7 APPLIED PROJECT ■ Designing a Dumpster
- DISCOVERY PROJECT ■ Quadratic Approximations and Critical Points
- 11.8 APPLIED PROJECT ■ Rocket Science
- APPLIED PROJECT ■ Hydro-Turbine Optimization

### 12 MULTIPLE INTEGRALS

- 12.5 DISCOVERY PROJECT ■ Volumes of Hyperspheres
- 12.6 DISCOVERY PROJECT ■ The Intersection of Three Cylinders
- 12.7 LABORATORY PROJECT ■ Families of Surfaces
- APPLIED PROJECT ■ Roller Derby

### 13 VECTOR CALCULUS

- 13.8 WRITING PROJECT ■ Three Men and Two Theorems

---

# ESSENTIAL CALCULUS

## Early Transcendentals

SECOND EDITION

**JAMES STEWART**

McMaster University  
and  
University of Toronto

 **BROOKS/COLE**  
CENGAGE Learning

Australia · Brazil · Japan · Korea · Mexico · Singapore · Spain · United Kingdom · United States

**Essential Calculus: Early Transcendentals,  
Second Edition****James Stewart**

Executive Editor: Liz Covello

Developmental Editor: Carolyn Crockett

Assistant Editor: Liza Neustaetter

Editorial Assistant: Jennifer Staller

Media Editor: Maureen Ross

Marketing Manager: Jennifer Jones

Marketing Coordinator: Michael Ledesma

Marketing Communications Manager:

Mary Anne Payumo

Content Project Manager: Cheryll Linthicum

Art Director: Vernon Boes

Manufacturing Planner: Becky Cross

Rights Acquisitions Specialist: Roberta Broyer

Production and Composition Service: TECH-arts

Photo Researcher: Terri Wright

Text Researcher: Terri Wright

Copy Editor: Kathi Townes

Composer: Stephanie Kuhns

Illustrator: TECH-arts

Text Designer: Geri Davis

Cover Designer: Denise Davidson

Cover Image: Denise Davidson

© 2013, 2007 Brooks/Cole, Cengage Learning

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced, transmitted, stored, or used in any form or by any means graphic, electronic, or mechanical, including but not limited to photocopying, recording, scanning, digitizing, taping, Web distribution, information networks, or information storage and retrieval systems, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the publisher.

For product information and technology assistance, contact us at  
**Cengage Learning Customer & Sales Support, 1-800-354-9706**

For permission to use material from this text or product,  
submit all requests online at **www.cengage.com/permissions**

Further permissions questions can be e-mailed to  
**permissionrequest@cengage.com**

Library of Congress Control Number: 2011942869

ISBN-13: 978-1-133-11228-0

ISBN-10: 1-133-11228-5

**Brooks/Cole**

20 Davis Drive

Belmont, CA 94002-3098

USA

Cengage Learning is a leading provider of customized learning solutions with office locations around the globe, including Singapore, the United Kingdom, Australia, Mexico, Brazil, and Japan. Locate your local office at **www.cengage.com/global**.

Cengage Learning products are represented in Canada by Nelson Education, Ltd.

To learn more about Brooks/Cole, visit  
**www.cengage.com/brookscole**

Purchase any of our products at your local college store or at our preferred online store **www.cengagebrain.com**.

**Trademarks**

Derive is a registered trademark of Soft Warehouse, Inc.

Maple is a registered trademark of Waterloo Maple, Inc.

Mathematica is a registered trademark of Wolfram Research, Inc.

Tools for Enriching is a trademark used herein under license.

Tailieu.vn

This is an electronic version of the print textbook. Due to electronic rights restrictions, some third party content may be suppressed. Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. The publisher reserves the right to remove content from this title at any time if subsequent rights restrictions require it. For valuable information on pricing, previous editions, changes to current editions, and alternate formats, please visit [www.cengage.com/highered](http://www.cengage.com/highered) to search by ISBN#, author, title, or keyword for materials in your areas of interest.





---

# CONTENTS

Preface	ix
To the Student	xvi
Diagnostic Tests	xvii

---

## 1 FUNCTIONS AND LIMITS 1

1.1	Functions and Their Representations	1
1.2	A Catalog of Essential Functions	11
1.3	The Limit of a Function	24
1.4	Calculating Limits	35
1.5	Continuity	46
1.6	Limits Involving Infinity	56
	Review	70

---

## 2 DERIVATIVES 73

2.1	Derivatives and Rates of Change	73
2.2	The Derivative as a Function	84
2.3	Basic Differentiation Formulas	95
2.4	The Product and Quotient Rules	107
2.5	The Chain Rule	114
2.6	Implicit Differentiation	123
2.7	Related Rates	128
2.8	Linear Approximations and Differentials	135
	Review	140

---

## 3 INVERSE FUNCTIONS: Exponential, Logarithmic, and Inverse Trigonometric Functions 145

3.1	Exponential Functions	145
3.2	Inverse Functions and Logarithms	151
3.3	Derivatives of Logarithmic and Exponential Functions	163

- 3.4 Exponential Growth and Decay 171
- 3.5 Inverse Trigonometric Functions 179
- 3.6 Hyperbolic Functions 184
- 3.7 Indeterminate Forms and l'Hospital's Rule 191
- Review 199

---

## **4 APPLICATIONS OF DIFFERENTIATION 203**

- 4.1 Maximum and Minimum Values 203
- 4.2 The Mean Value Theorem 210
- 4.3 Derivatives and the Shapes of Graphs 216
- 4.4 Curve Sketching 225
- 4.5 Optimization Problems 231
- 4.6 Newton's Method 242
- 4.7 Antiderivatives 247
- Review 253

---

## **5 INTEGRALS 257**

- 5.1 Areas and Distances 257
- 5.2 The Definite Integral 268
- 5.3 Evaluating Definite Integrals 281
- 5.4 The Fundamental Theorem of Calculus 291
- 5.5 The Substitution Rule 300
- Review 308

---

## **6 TECHNIQUES OF INTEGRATION 311**

- 6.1 Integration by Parts 311
- 6.2 Trigonometric Integrals and Substitutions 317
- 6.3 Partial Fractions 327
- 6.4 Integration with Tables and Computer Algebra Systems 335
- 6.5 Approximate Integration 341
- 6.6 Improper Integrals 353
- Review 362

---

## **7** | APPLICATIONS OF INTEGRATION 365

- 7.1** Areas Between Curves 365
- 7.2** Volumes 370
- 7.3** Volumes by Cylindrical Shells 381
- 7.4** Arc Length 386
- 7.5** Area of a Surface of Revolution 393
- 7.6** Applications to Physics and Engineering 398
- 7.7** Differential Equations 412
- Review 421

---

## **8** | SERIES 425

- 8.1** Sequences 425
- 8.2** Series 436
- 8.3** The Integral and Comparison Tests 446
- 8.4** Other Convergence Tests 454
- 8.5** Power Series 464
- 8.6** Representing Functions as Power Series 470
- 8.7** Taylor and Maclaurin Series 476
- 8.8** Applications of Taylor Polynomials 489
- Review 497

---

## **9** | PARAMETRIC EQUATIONS AND POLAR COORDINATES 501

- 9.1** Parametric Curves 501
- 9.2** Calculus with Parametric Curves 508
- 9.3** Polar Coordinates 515
- 9.4** Areas and Lengths in Polar Coordinates 524
- 9.5** Conic Sections in Polar Coordinates 529
- Review 535

---

## 10 | VECTORS AND THE GEOMETRY OF SPACE 537

- 10.1 Three-Dimensional Coordinate Systems 537
- 10.2 Vectors 542
- 10.3 The Dot Product 551
- 10.4 The Cross Product 558
- 10.5 Equations of Lines and Planes 566
- 10.6 Cylinders and Quadric Surfaces 574
- 10.7 Vector Functions and Space Curves 580
- 10.8 Arc Length and Curvature 591
- 10.9 Motion in Space: Velocity and Acceleration 600
- Review 610

---

## 11 | PARTIAL DERIVATIVES 615

- 11.1 Functions of Several Variables 615
- 11.2 Limits and Continuity 626
- 11.3 Partial Derivatives 633
- 11.4 Tangent Planes and Linear Approximations 641
- 11.5 The Chain Rule 649
- 11.6 Directional Derivatives and the Gradient Vector 658
- 11.7 Maximum and Minimum Values 669
- 11.8 Lagrange Multipliers 677
- Review 685

---

## 12 | MULTIPLE INTEGRALS 689

- 12.1 Double Integrals over Rectangles 689
- 12.2 Double Integrals over General Regions 700
- 12.3 Double Integrals in Polar Coordinates 709
- 12.4 Applications of Double Integrals 715
- 12.5 Triple Integrals 720
- 12.6 Triple Integrals in Cylindrical Coordinates 731
- 12.7 Triple Integrals in Spherical Coordinates 735
- 12.8 Change of Variables in Multiple Integrals 742
- Review 751

---

**13** | **VECTOR CALCULUS 755**

<b>13.1</b>	Vector Fields	755
<b>13.2</b>	Line Integrals	761
<b>13.3</b>	The Fundamental Theorem for Line Integrals	773
<b>13.4</b>	Green's Theorem	782
<b>13.5</b>	Curl and Divergence	789
<b>13.6</b>	Parametric Surfaces and Their Areas	797
<b>13.7</b>	Surface Integrals	807
<b>13.8</b>	Stokes' Theorem	818
<b>13.9</b>	The Divergence Theorem	823
	Review	830

---

**APPENDIXES A1**

<b>A</b>	Trigonometry	A1
<b>B</b>	Sigma Notation	A10
<b>C</b>	The Logarithm Defined as an Integral	A15
<b>D</b>	Proofs	A22
<b>E</b>	Answers to Odd-Numbered Exercises	A39

**INDEX A89**



---

# PREFACE

This book is a response to those instructors who feel that calculus textbooks are too big. In writing the book I asked myself: What is *essential* for a three-semester calculus course for scientists and engineers?

The book is about two-thirds the size of my other calculus books (*Calculus*, Seventh Edition and *Calculus, Early Transcendentals*, Seventh Edition) and yet it contains almost all of the same topics. I have achieved relative brevity mainly by condensing the exposition and by putting some of the features on the website [www.stewartcalculus.com](http://www.stewartcalculus.com). Here, in more detail are some of the ways I have reduced the bulk:

- I have organized topics in an efficient way and rewritten some sections with briefer exposition.
- The design saves space. In particular, chapter opening spreads and photographs have been eliminated.
- The number of examples is slightly reduced. Additional examples are provided online.
- The number of exercises is somewhat reduced, though most instructors will find that there are plenty. In addition, instructors have access to the archived problems on the website.
- Although I think projects can be a very valuable experience for students, I have removed them from the book and placed them on the website.
- A discussion of the principles of problem solving and a collection of challenging problems for each chapter have been moved to the website.

Despite the reduced size of the book, there is still a modern flavor: Conceptual understanding and technology are not neglected, though they are not as prominent as in my other books.

---

## ALTERNATE VERSIONS

I have written several other calculus textbooks that might be preferable for some instructors. Most of them also come in single variable and multivariable versions.

- *Essential Calculus*, Second Edition, is similar to the present textbook except that the logarithm is defined as an integral and so the exponential, logarithmic, and inverse trigonometric functions are covered later than in the present book.
- *Calculus: Early Transcendentals*, Seventh Edition, has more complete coverage of calculus than the present book, with somewhat more examples and exercises.
- *Calculus: Early Transcendentals*, Seventh Edition, Hybrid Version, is similar to *Calculus: Early Transcendentals*, Seventh Edition, in content and coverage except that all of the end-of-section exercises are available only in Enhanced WebAssign. The printed text includes all end-of-chapter review material.
- *Calculus*, Seventh Edition, is similar to *Calculus: Early Transcendentals*, Seventh Edition, except that the exponential, logarithmic, and inverse trigonometric functions are covered in the second semester. It is also available in a Hybrid Version.

- *Calculus: Concepts and Contexts*, Fourth Edition, emphasizes conceptual understanding. The coverage of topics is not encyclopedic and the material on transcendental functions and on parametric equations is woven throughout the book instead of being treated in separate chapters. It is also available in a Hybrid Version.
- *Calculus: Early Vectors* introduces vectors and vector functions in the first semester and integrates them throughout the book. It is suitable for students taking Engineering and Physics courses concurrently with calculus.
- *Brief Applied Calculus* is intended for students in business, the social sciences, and the life sciences. It is also available in a Hybrid Version.

---

## WHAT'S NEW IN THE SECOND EDITION?

The changes have resulted from talking with my colleagues and students at the University of Toronto and from reading journals, as well as suggestions from users and reviewers. Here are some of the many improvements that I've incorporated into this edition:

- At the beginning of the book there are four diagnostic tests, in Basic Algebra, Analytic Geometry, Functions, and Trigonometry. Answers are given and students who don't do well are referred to where they should seek help (Appendixes, review sections of Chapter 1, and the website).
- Section 7.5 (Area of a Surface of Revolution) is new. I had asked reviewers if there was any topic missing from the first edition that they regarded as essential. This was the only topic that was mentioned by more than one reviewer.
- Some material has been rewritten for greater clarity or for better motivation. See, for instance, the introduction to maximum and minimum values on pages 203–04 and the introduction to series on page 436.
- New examples have been added (see Example 4 on page 725 for instance). And the solutions to some of the existing examples have been amplified. A case in point: I added details to the solution of Example 1.4.9 because when I taught Section 1.4 from the first edition I realized that students need more guidance when setting up inequalities for the Squeeze Theorem.
- The data in examples and exercises have been updated to be more timely.
- Several new historical margin notes have been added.
- About 40% of the exercises are new. Here are some of my favorites: 1.6.43, 2.2.13–14, 2.5.59, 2.6.39–40, 3.2.70, 4.3.66, 5.3.44–45, 7.6.24, 8.2.29–30, 8.7.67–68, 10.1.38, 10.4.43–44
- The animations in *Tools for Enriching Calculus* (TEC) have been completely redesigned and are accessible in Enhanced WebAssign, CourseMate, and PowerLecture. Selected Visuals and Modules are available at [www.stewartcalculus.com](http://www.stewartcalculus.com).

---

## CONTENT

**DIAGNOSTIC TESTS** ■ The book begins with four diagnostic tests, in Basic Algebra, Analytic Geometry, Functions, and Trigonometry.

**CHAPTER 1 ■ FUNCTIONS AND LIMITS** After a brief review of the basic functions, limits and continuity are introduced, including limits of trigonometric functions, limits involving infinity, and precise definitions.



**CHAPTER 2 ■ DERIVATIVES** The material on derivatives is covered in two sections in order to give students time to get used to the idea of a derivative as a function. The formulas for the derivatives of the sine and cosine functions are derived in the section on basic differentiation formulas. Exercises explore the meanings of derivatives in various contexts.

**CHAPTER 3 ■ INVERSE FUNCTIONS: EXPONENTIAL, LOGARITHMIC, AND INVERSE TRIGONOMETRIC FUNCTIONS** Exponential functions are defined first and the number  $e$  is defined as a limit. Logarithms are then defined as inverse functions. Applications to exponential growth and decay follow. Inverse trigonometric functions and hyperbolic functions are also covered here. L'Hospital's Rule is included in this chapter because limits of transcendental functions so often require it.

**CHAPTER 4 ■ APPLICATIONS OF DIFFERENTIATION** The basic facts concerning extreme values and shapes of curves are deduced from the Mean Value Theorem. The section on curve sketching includes a brief treatment of graphing with technology. The section on optimization problems contains a brief discussion of applications to business and economics.

**CHAPTER 5 ■ INTEGRALS** The area problem and the distance problem serve to motivate the definite integral, with sigma notation introduced as needed. (Full coverage of sigma notation is provided in Appendix B.) A quite general definition of the definite integral (with unequal subintervals) is given initially before regular partitions are employed. Emphasis is placed on explaining the meanings of integrals in various contexts and on estimating their values from graphs and tables.

**CHAPTER 6 ■ TECHNIQUES OF INTEGRATION** All the standard methods are covered, as well as computer algebra systems, numerical methods, and improper integrals.

**CHAPTER 7 ■ APPLICATIONS OF INTEGRATION** General methods are emphasized. The goal is for students to be able to divide a quantity into small pieces, estimate with Riemann sums, and recognize the limit as an integral. The chapter concludes with an introduction to differential equations, including separable equations and direction fields.

**CHAPTER 8 ■ SERIES** The convergence tests have intuitive justifications as well as formal proofs. The emphasis is on Taylor series and polynomials and their applications to physics. Error estimates include those based on Taylor's Formula (with Lagrange's form of the remainder term) and those from graphing devices.

**CHAPTER 9 ■ PARAMETRIC EQUATIONS AND POLAR COORDINATES** This chapter introduces parametric and polar curves and applies the methods of calculus to them. A brief treatment of conic sections in polar coordinates prepares the way for Kepler's Laws in Chapter 10.

**CHAPTER 10 ■ VECTORS AND THE GEOMETRY OF SPACE** In addition to the material on vectors, dot and cross products, lines, planes, and surfaces, this chapter covers vector-valued functions, length and curvature of space curves, and velocity and acceleration along space curves, culminating in Kepler's laws.

**CHAPTER 11 ■ PARTIAL DERIVATIVES** In view of the fact that many students have difficulty forming mental pictures of the concepts of this chapter, I've placed a special emphasis on graphics to elucidate such ideas as graphs, contour maps, directional derivatives, gradients, and Lagrange multipliers.

**CHAPTER 12 ■ MULTIPLE INTEGRALS** Cylindrical and spherical coordinates are introduced in the context of evaluating triple integrals.

**CHAPTER 13 ■ VECTOR CALCULUS** The similarities among the Fundamental Theorem for line integrals, Green's Theorem, Stokes' Theorem, and the Divergence Theorem are emphasized.

---

## WEBSITE

The web site [www.stewartcalculus.com](http://www.stewartcalculus.com) includes the following.

- Review of Algebra, Trigonometry, Analytic Geometry, and Conic Sections
- Homework Hints
- Additional Examples
- Projects
- Archived Problems (drill exercises that were in previous editions of my other books), together with their solutions
- Challenge Problems
- Lies My Calculator and Computer Told Me
- Additional Topics (complete with exercise sets): Principles of Problem Solving, Strategy for Integration, Strategy for Testing Series, Fourier Series, Linear Differential Equations, Second Order Linear Differential Equations, Nonhomogeneous Linear Equations, Applications of Second Order Differential Equations, Using Series to Solve Differential Equations, Complex Numbers, Rotation of Axes
- Links, for particular topics, to outside Web resources
- History of Mathematics, with links to the better historical websites
- TEC animations for Chapters 2 and 5

---

## ACKNOWLEDGMENTS

I thank the following reviewers for their thoughtful comments:

- Allison Arnold, *University of Georgia*  
 Rachel Belinsky, *Georgia State University*  
 Geoffrey D. Birky, *Georgetown University*  
 Przemyslaw Bogacki, *Old Dominion University*  
 Mark Brittenham, *University of Nebraska at Lincoln*  
 Katrina K. A. Cunningham, *Southern University and A&M College*  
 Morley Davidson, *Kent State University*  
 M. Hilary Davies, *University of Alaska Anchorage*  
 Shelby J. Kilmer, *Missouri State University*  
 Ilya Kofman, *College of Staten Island, CUNY*  
 Ramendra Krishna Bose, *University of Texas–Pan American*

## SECOND EDITION REVIEWERS

Melvin Lax, *California State University Long Beach*  
Derek Martinez, *Central New Mexico Community College*  
Alex M. McAllister, *Centre College*  
Michael McAsey, *Bradley University*  
Humberto Munoz, *Southern University and A&M College*  
Charlotte Newsom, *Tidewater Community College*  
Michael Price, *University of Oregon*  
Joe Rody, *Arizona State University*  
Vicki Sealey, *West Virginia University*  
David Shannon, *Transylvania University*

#### FIRST EDITION REVIEWERS

Ulrich Albrecht, *Auburn University*  
Christopher Butler, *Case Western Reserve University*  
Joe Fisher, *University of Cincinnati*  
John Goulet, *Worcester Polytechnic Institute*  
Irvin Hentzel, *Iowa State University*  
Joel Irish, *University of Southern Maine*  
Mary Nelson, *University of Colorado, Boulder*  
Ed Slaminka, *Auburn University*  
Li (Jason) Zhongshan, *Georgia State University*

I also thank Jim Propp of the University of Massachusetts–Lowell for a number of suggestions resulting from his teaching from the first edition.

In addition, I thank Kathi Townes and Stephanie Kuhns for their production services and the following Brooks/Cole staff: Cheryll Linthicum, editorial content project manager; Vernon Boes, art director; Jennifer Jones and Mary Anne Payumo, marketing team; Maureen Ross, media editor; Carolyn Crockett, development editor; Elizabeth Neustaetter, assistant editor; Jennifer Staller, editorial assistant; Roberta Broyer, rights acquisitions specialist; Becky Cross, manufacturing planner; and Denise Davidson, cover designer. They have all done an outstanding job.

The idea for this book came from my former editor Bob Pirtle, who had been hearing of the desire for a much shorter calculus text from numerous instructors. I thank my present editor Liz Covello for sustaining and supporting this idea in the second edition.

JAMES STEWART

## ANCILLARIES FOR INSTRUCTORS

### PowerLecture

ISBN 1-133-52566-0

This comprehensive DVD contains all art from the text in both jpeg and PowerPoint formats, complete pre-built PowerPoint lectures, an electronic version of the Instructor's Guide, Solution Builder, ExamView algorithmic testing software, Tools for Enriching Calculus, and video instruction.

### Instructor's Guide

By Douglas Shaw

ISBN 1-133-52510-5

Each section of the text is discussed from several viewpoints. The Instructor's Guide contains suggested time to allot, points to stress, text discussion topics, core materials for lecture, work-show/discussion suggestions, group work exercises in a form suitable for handout, and suggested homework assignments. An electronic version of the Instructor's Guide is available on the PowerLecture DVD.

### Complete Solutions Manual

ISBN 1-133-36444-6

Includes worked-out solutions to all exercises in the text.

### Solution Builder

[www.cengage.com/solutionbuilder](http://www.cengage.com/solutionbuilder)

This online instructor database offers complete worked-out solutions to all exercises in the text. Solution Builder allows you to create customized, secure solution printouts (in PDF format) matched exactly to the problems you assign in class.

### ExamView Algorithmic Testing

Create, deliver, and customize tests in print and online formats with ExamView, an easy-to-use assessment and tutorial software. ExamView contains hundreds of multiple-choice, numerical response, and short answer test items. ExamView algorithmic testing is available on the PowerLecture DVD.

## ANCILLARIES FOR INSTRUCTORS AND STUDENTS

### Stewart Website

[www.stewartcalculus.com](http://www.stewartcalculus.com)

Contents: *Review of Algebra, Trigonometry, Analytic Geometry, and Conic Sections* ■ *Homework Hints* ■

*Additional Examples* ■ *Projects* ■ *Archived Problems* ■ *Challenge Problems* ■ *Lies My Calculator and Computer Told Me* ■ *Principles of Problem Solving* ■ *Additional Topics* ■ *Web Links* ■ *History of Mathematics*

### TEC Tools for Enriching™ Calculus

By James Stewart, Harvey Keynes, Dan Clegg, and developer Hu Hohn

Tools for Enriching Calculus (TEC) functions as both a powerful tool for instructors, as well as a tutorial environment in which students can explore and review selected topics. The Flash simulation modules in TEC include instructions, written and audio explanations, and exercises. TEC modules are assignable in Enhanced WebAssign. TEC is also available at [www.stewartcalculus.com](http://www.stewartcalculus.com), as well as in the YouBook and CourseMate.

ENHANCED

WebAssign Enhanced WebAssign

[www.webassign.net](http://www.webassign.net)

WebAssign's homework system lets instructors deliver, collect, and record assignments via the Web. Enhanced WebAssign for Stewart's *Essential Calculus: Early Transcendentals* now includes opportunities for students to review prerequisite skills and content both at the start of the course and at the beginning of each section. In addition, for selected problems, students can get extra help in the form of "enhanced feedback" (rejoinders) and video solutions. *Other key features include:* thousands of problems from Stewart's *Essential Calculus: Early Transcendentals*, a *QuickPrep for Calculus* review, a customizable Cengage YouBook, Just In Time Review questions, a Show My Work feature, assignable Tools for Enriching Calculus modules, quizzes, lecture videos (with associated questions), and more!

### Cengage Customizable YouBook

YouBook is an eBook that is both interactive and customizable! Containing all the content from Stewart's *Essential Calculus: Early Transcendentals*, YouBook features a text edit tool that allows instructors to modify the textbook narrative as needed. With YouBook, instructors can quickly reorder entire sections and chapters or hide any content they don't teach to create an eBook that perfectly matches their syllabus. Instructors can further customize the text by adding instructor-created or YouTube video links. Additional media assets include: Tools for Enriching Calculus visuals and modules, Wolfram animations, video clips, highlighting, notes, and more! YouBook is available in Enhanced WebAssign.