

Multivariable Calculus

By Gerald L. Bradley, Karl J. Smith

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Presents calculus development by integrating technology (with either graphing calculator or computer). The Computational Windows feature offers insights into how technological advances can be used to help understand calculus.

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Editorial Review

From the Publisher
This text is a perfect blend of reform calculus and traditional calculus.

From the Back Cover
Built from the ground up, to meet the needs of those learning calculus today, Bradley/Smith, Calculus was the first book to pair a complete calculus syllabus with the best elements of reform—like extensive verbalization and strong geometric visualization. The Third Edition of this groundbreaking book has been crafted and honed, making it the book of choice for those seeking the best of both worlds. Numerous chapters offer an exciting choice of problem sets and include topics such as vectors in the plane and in space, vector-valued functions, partial differentiation, multiple integration, introduction to vector analysis, and introduction to differential equations. For individuals learning calculus for their futures in various engineering, science, or math fields.

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This text was developed to blend the best aspects of calculus reform with the reasonable goals and methodology of traditional calculus. It achieves this middle ground by providing sound development, stimulating problems, and well-developed pedagogy within a framework of a traditional structure. "Think, then do," is a fair summary of our approach.

New to this Edition

The acceptance and response from our first two editions has been most gratifying. For the third edition, we wanted to take a good book and make it even better. If you are familiar with the previous editions, the first thing you will notice is that we have added a new coauthor, Monty J. Strauss. His added expertise, and his attention to accuracy and detail, as well as his many years of experience teaching calculus, have added a new dimension to our exposition. Here is what is new in the third edition:

Organization

- In this edition we introduce ex and In x in Chapter 2 after we have defined the notion of a limit. This is beneficial because it allows the number a to be properly defined using limits. We also assume a knowledge of the conic sections and their graphs. A free *Student Mathematics Handbook* is available that provides review and reference material on these transcendental functions.
- 1'Hopital's Rule is now covered earlier in Chapter 4. This placement allows instructors to explore more interesting applications like curve sketching.
- A new section covering applications to business, economics, and the life sciences has been added to Chapter 6 on Applications of the Integral. This new material is designed to help students see how calculus relates to and is used in other disciplines.
- The chapter on polar coordinates and parametric forms has been distributed to other chapters in the book. The polar coordinate system and graphing in polar forms is in Chapter 6 in the context of the integration topic of finding areas. Parametric representation of curves now appears in the book where it is first needed, in Chapter 9.
- Modeling continues as a major theme in this edition. Modeling is now introduced in Section 3.4, and then appears in almost every section of the book. These applications are designated MODELING PROBLEMS.

Some authors use the words "Modeling Problem" to refer to any applied problem. In the third edition of Calculus, we make a distinction between *modeling problems* and *application problems* by defining a modeling problem as follows. A **modeling problem** is a problem that requires that the reader make some assumptions about the real world in order to derive or come up with the necessary mathematical formula or mathematical information to answer the question. These problems also include real-world examples of modeling by citing the source of the book or journal that shows the modeling process.

Problem Sets

- We have added a new major category of problems, called **counterexample problem.** A *counterexample* is an example that disproves a proposition or theorem, and in mathematics we are often faced with a proposition that is true or false, and our task is to prove the proposition true or to find a counterexample to disprove the proposition. In the third edition of *Calculus,* we attempt to build the student's ability with this type of situation to mean that the student must either find justification that the proposition is true or else find a counterexample. We believe this new form of problem to be important for preparing the student for future work in not only advanced mathematics courses, but also for analytically oriented courses.
- **Exploration Problems** explore concepts which may prove true or false and provide opportunities for innovative thinking.
- **Interpretation Problems** require exposition that requires a line of thinking that is not directly covered in the textbook.

Supplements

- **Interactive CD** (free with every new copy). The new CD-ROM is designed to enhance students' computational and conceptual understanding of calculus. This CDROM is not an add-on of extra material to the text but rather an incredibly useful expansion of the text. See the media supplement portion of the Walk-Through for a complete description of each CD.
- **TestGen-EQ.** This easy to use test generator contains all of the questions from the printed Test Item File.
- **Prentice Hall Online Homework Grader.** For more details, see the PH Homework Grader section in the Walk-Through.

Hallmark Features

Some of the distinguishing characteristics of the earlier editions are continued with this edition:

- It is possible to begin the course with either Chapter 1 or Chapter 2 (where the calculus topics begin).
- We believe that students *learn* mathematics by *doing* mathematics. Therefore, the **problems and applications** are perhaps the most important feature of any calculus book. You will find that the problems in this book extend from routine practice to challenging. The problem sets are divided into A Problems (routine), B Problems (requiring independent thought), and C Problems (theory problems). You will find the scope and depth of the problems in this book to be extraordinary while engineering and physics examples and problems play a prominent role, we include applications from a wide variety of fields, such as biology, economics, ecology, psychology, and sociology. In addition, the chapter summaries provide not only topical review, but also many miscellaneous exercises. Although the chapter reviews are typical of examinations, the miscellaneous problems are not presented as graded problems, but rather as a random list of problems loosely tied to the ideas of that chapter. In addition, there are cumulative reviews located at natural subdivision points in the text: Chapters 1-5, Chapters 6-8, Chapters 1-10, and Chapters 11-13. For a full description of each type of problem available, see pages xviii through xxi of WalkThrough.
- We understand that students often struggle with prerequisite material. Further, it is often frustrating for instructors to have to reteach material from previous courses. As a result, we have created a unique

Student Mathematics Handbook. This handbook functions as a **"Just-in-Time" Precalculus Review** that provides precalculus drill/review material, a catalog of curves, analytic geometry, and integral tables. Students are guided through the text to this handbook by a SMH symbol located in the text margin. This guide is entirely author-written and offered FREE with every new copy of the text.

- We have taken the introduction of **differential equations** seriously. Students in many allied disciplines need to use differential equations early in their studies and consequently cannot wait for a postcalculus course. We introduce differential equations in a natural and reasonable way. Slope fields are introduced as a geometric view of antidifferentiation in Section 5.1, and then are used to introduce a pphical solution to differential equations in Section 5.6. We consider separable ditferential equations in Chapter 5 and first-order linear equations in Chapter 7, and demonstrate the use of both modeling a variety of applied situations. Exact and homogeneous differential equations appear in Chapter 14, along with an introduction to second-order linear equations. The "early and often" approach to differential equations is intended to illustrate their value in continuous modeling and to provide a solid foundation for further study.
- **Visualization** is used to help students develop better intuition. Much of this visualization appears in the wide margins to accompany the text. Also, since tough calculus problems are often tough geometry (and algebra) problems, this emphasis on graphs will help students' problem-solving skills. Additional graphs are related to the student problems, including answer art.
- We have included dozens of "TECHNOLOGY NOTES" devoted to the use of technology. We strive to keep such references "platform neutral" because specific calculators and computer programs frequently change and are better considered in separate technology manuals. These references are designed to give insight into how technological advances can be used to help understand calculus. Problems requiring a graphing calculator or software and computer also appear in the exercises. On the other hand, problems that are not specially designated may still use technology (for example, to solve a higher-degree equation). Several technology manuals are also available at a discount price. See Instructor/Student Supplement section in the Walk-Through for details.
- **Guest essays** provide alternate viewpoints. The questions that follow are called MATHEMATICAL ESSAYS and are included to encourage individual writing assignments and mathematical exposition. We believe that students will benefit from individual writing and research in mathematics. Another pedagogical feature is the **"What this says:"** box in which we rephrase mathematical ideas in everyday language. In the problem sets we encourage students to summarize procedures and processes or to describe a mathematical result in everyday terms.
- **Group research projects,** each of which appears at the end of a chapter and involves intriguing questions whose mathematical content is tied loosely to the chapter just concluded. These projects have been developed and class-tested by their individual authors, to whom we are greatly indebted. Note that the complexity of these projects increases as we progress through the book and the mathematical maturity of the student is developed.
- We continue to utilize the **humanness** of mathematics. History is not presented as additional material to learn. Rather we have placed history into *problems* that lead the reader from the development of a concept to actually participating in the discovery process. The problems are designated as Hist...

Users Review

From reader reviews:

Patricia Thomas:

Nowadays reading books are more than want or need but also turn into a life style. This reading routine give you lot of advantages. The advantages you got of course the knowledge the particular information inside the book that improve your knowledge and information. The knowledge you get based on what kind of book you

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Gary Lopez:

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Eddie Barber:

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