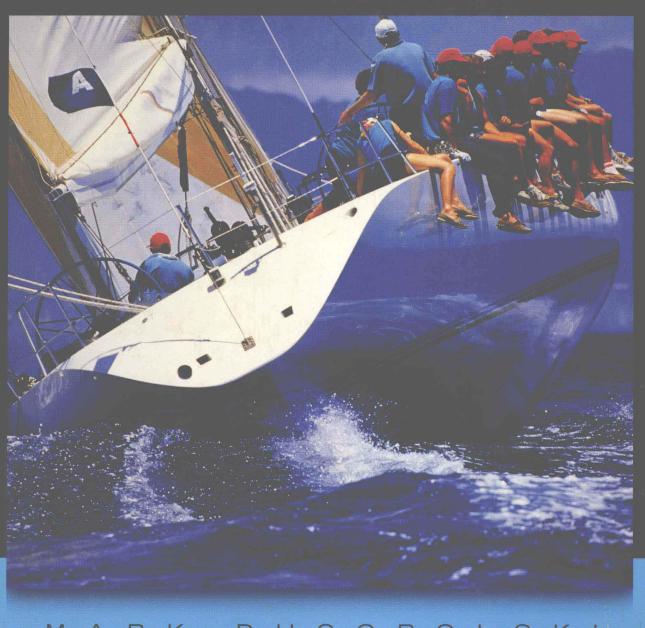
Precalculus

Functions and Graphs



MARK DUGOPOLSKI



PRECALCULUS

Functions and Graphs

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Preface

This text is designed for students who are preparing to study calculus. For those students, this text will provide the skills, understanding, and insights necessary for success in future math courses. A hallmark of this text is its focus on problem solving. Students are provided with numerous opportunities to reason and think their way through various problems. Practicing such critical thinking skills will prove of future benefit to all students. I believe that the mathematics presented here is interesting, useful, and worth studying. Getting students to feel this way has been one of my goals in writing this text.

Two versions of this text are available: Precalculus: Functions and Graphs and Precalculus with Limits: Functions and Graphs. Precalculus: Functions and Graphs contains all of the traditional precalculus topics. It is designed to build the skills and concepts that are necessary for success in calculus. Precalculus with Limits: Functions and Graphs contains two extra chapters—Chapter 12: Analytic Geometry and Vectors in Three Dimensions and Chapter 13: Limits. These extra chapters are designed for use in courses where a stronger preparation for calculus is desired. Both texts contain an appendix that summarizes basic algebra concepts. As a result, these texts are suitable for a wide range of courses of various lengths.

Use of Technology

I place emphasis on using graphic, numeric, and analytic points of view in discussion and in solving problems throughout the text. I also provide the opportunity for optional use of the graphing calculator as a tool to help students understand the concepts of algebra, and provide support for algebraic conclusions. Although the use of technology is optional, students who do not use a graphing calculator can still benefit from the technology discussions, as well as from the calculator-generated graphs that occur in the text. Any graphing utility or computer mathematics package can be used in place of the graphing calculator.

Due to the rapid changes in technology and the differences among brands, this text does not give specific instructions on how to use the various graphing calculators that are available. However, the *Graphing Calculator Manual* that accompanies this text provides students with keystroke operations for many of the more popular graphing calculators, using specific examples drawn from this text to illustrate the various functions of those calculators.

Text Features

Chapter Opener Each chapter begins with a discussion of real-world situations in which the mathematics of the chapter is used. Examples and exercises that relate back to the opener are included within the chapter.

Function Gallery These graphic galleries occur in the chapters where functions are discussed. They are used to summarize the basic functions along with their graphs and properties.

Foreshadowing Calculus This feature gives a brief indication of the connection between certain algebraic topics and calculus, and identifies topics that will be continued in calculus.

Graphing Calculator Discussions Optional graphing calculator discussions have been integrated into the text and are clearly marked by graphing calculator icons so that they can be easily skipped by those not using this technology.

Index of Applications The many applications contained within the text are listed in an Index of Applications that appears in the front of the text. The applications are page-referenced and grouped by subject matter.

For Thought Each exercise set begins with a set of true or false questions that review the basic concepts in that section, they help check student understanding before beginning the exercises, and offer opportunities for writing and/or discussion.

Exercise Sets The exercise sets in this book have been examined carefully to ensure that the exercises range from easy to challenging, and are arranged in order of increasing difficulty. In addition, there are hundreds of applications throughout the book that involve real-world situations and often cite data sources. The emphasis of these applications is on understanding concepts and relationships. Many regression problems have also been included in the text, so that students can start with real data, and use a calculator to obtain mathematical models of real problem situations. Optional exercises that require a graphing calculator are located throughout the exercise sets in the book and are marked with a graphing calculator icon A.

Writing/Discussion and Cooperative Learning Exercises These exercises deepen understanding by getting students to express mathematical ideas in writing, or to their classmates during small group or team discussions.

Linking Concepts This feature appears at the end of nearly every exercise set. It is a multi-part exercise or exploration that can be used for individual or group work. This feature uses a concept from the current section along with concepts from preceding sections in the chapter and preceding chapters to solve problems that illustrate the links among various concepts. Some parts of these questions are openended, and require somewhat more thought than standard exercises. Answers to this feature are given only in the Instructor's Solutions Manual.

Highlights This end-of-chapter feature presents an overview of each section of the chapter, and is a useful summary of the basic information that students should have mastered in that chapter.

Chapter Review Exercises These exercises are designed to help students review the chapter without reference to the individual sections, and prepare students for the Chapter Test.

Chapter Test The problems in the Chapter Test are designed to measure students' readiness for a classroom test. Instructors may also use them as a model for their own end-of-chapter tests.

Tying It All Together These exercises help students review selected concepts from the present and prior chapters, and require students to integrate multiple concepts and skills.

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I also want to thank the many professors and students who have written to me with comments and suggestions. I am always glad to hear from users of my texts. You can write to me at the Department of Mathematics, Southeastern Louisiana University, Hammond, LA 70402, or send e-mail to MDugopolski@SELU.EDU.

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x Preface

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M.D. Hammond, Louisiana

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