

## **Enhancing a Tradition of Success**

We take great satisfaction from the fact that more than 100,000 students have learned college algebra from a Barnett Series textbook. Ray Barnett is one of the masters of college textbook writing. His central approach is proven and remains effective for today's students.

The third edition of *College Algebra: Graphs and Models* has benefited greatly from the numerous contributions of new coauthor Dave Sobecki of Miami University Hamilton. Dave brings a fresh approach to the material and many good suggestions for improving **student accessibility**. Every aspect of the revision focuses on making the text more relevant to students, while retaining the precise presentation of the mathematics for which the Barnett name is renowned.

Specifically we concentrated on the areas of writing, worked examples, exercises, technology, and design. Based on numerous reviews, advice from expert consultants, and direct correspondence with many users of previous editions, we feel that this edition is more relevant than ever before. We hope you will agree.

**Writing** Without sacrificing breadth or depth or coverage, we have rewritten explanations to make them clearer and more direct. As in previous editions, the text emphasizes computational skills, real-world data analysis and modeling, and problem solving rather than theory.

**Examples** In the new edition even more solved examples in the book provide graphical solutions side-by-side with algebraic solutions. By seeing the same answer result from their

symbol manipulations *and* from graphical approaches, students gain insight into the power of algebra and make important conceptual and visual connections.

Likewise, we added expanded color annotations to many examples, explaining the solution steps in words. Each example is then followed by a similar matched problem for the student to solve. Answers to the matched problems are located at the end of each section for easy reference. This active involvement in learning while reading helps students develop a more thorough understanding of concepts and processes.

**Exercises** With an eye to improving student performance *and* to make the book more useful for instructors, we have extensively revised the exercise sets. We added hundreds of new writing questions as well as exercises at the easy to moderate level and expanded the variety of problem types to ensure a gradual increase in difficulty level throughout each exercise set.

**Technology** Although technology is employed throughout, we strive to balance algebraic skill development with the use of technology as an aid to learning and problem solving. We assume that students using the book will have access to one of the various graphing calculators or computer programs that are available to perform the following operations:

- Simultaneously display multiple graphs in a user-selected viewing window
- Explore graphs using trace and zoom
- Approximate roots and intersection points
- Approximate maxima and minima
- Plot data sets and find associated regression equations
- Perform basic matrix operations, including row reduction and inversion

Most popular graphing calculators perform all of these operations. The majority of the graphing utility images in this book are “screen dumps” from a Texas Instruments TI-83 Plus graphing calculator. Students not using that TI calculator should be able to produce similar results on any calculator or software meeting the requirements listed. The proper use of such utilities is covered in Section 1.1.

### **A Central Theme**

In the Barnett series, the function concept serves as a unifying theme. A brief look at the table of contents reveals this emphasis. A major objective of this book is the development of a library of elementary functions, including their important properties and uses. Employing this library as a basic working tool, students will be able to proceed through this book with greater confidence and understanding.

### **Design: A New Book with a New Look**

The third edition of *College Algebra: Graphs & Models* presents the subject in the precise and straightforward way that users have come to rely on in the Barnett textbooks, now updated for students in the twenty-first century. The changes to the text are manifested visually in a new design. We think the pages of this edition offer a more contemporary and inviting visual backdrop for the mathematics.

### **Features**

### **New to the Third Edition**

An extensive **reworking of the narrative** throughout the chapters has made the language less formal and more engaging for students.

A **new full-color design** gives the book a more contemporary feel and will appeal to students who are accustomed to high production values in books, magazines, and nonprint media.

Even more examples now feature **side-by-side solutions** integrating algebraic and graphical solution methods. This format encourages students to investigate mathematical principles and processes graphically and numerically, as well as algebraically.

The increased use of **annotated algebraic steps**, in small colored type, to walk students through each critical step in the problem-solving process helps students follow the authors' reasoning and improve their own problem-solving strategies.

An **Annotated Instructor's Edition** is now available and contains answers to exercises in the text, including answers to section, chapter review, and cumulative review exercises. These answers are printed in a second color, adjacent to corresponding exercises, for ease of use by the instructor.

More **balanced exercise sets** give instructors maximum flexibility in assigning homework. We added exercises at the easy to moderate level and expanded the variety of problem types to ensure a gradual increase in difficulty level throughout each exercise set. The division of exercise sets into A (routine, easy mechanics), B (more difficult mechanics), and C (difficult mechanics and some theory) is no longer explicit in the student edition of the text: the letter designations appear only in the Annotated Instructor's Edition. This change was made in order to avoid fueling students' anxiety about challenging exercises. As in previous editions, students at all levels can be challenged by the exercises in this text.

Hundreds of new **writing questions** encourage students to think about the important concepts of the section *before* solving computational problems. Problem numbers that appear in blue indicate problems that require students to apply their reasoning and writing skills to the solution of the problem.

## **Features Retained**

*Examples and Matched Problems* introduce concepts and demonstrate problem-solving techniques using side-by-side algebraic and graphical solution methods. Each carefully solved example is followed by a similar Matched Problem for the student to work through while reading the material. Answers to the matched problems are located at the end of each section, for easy reference. This active involvement in the learning process helps students develop a more thorough understanding of algebraic and graphical concepts and processes.

*Graphing Calculator Technology* is integrated throughout the text for visualization, investigation, and verification. Graphing calculator screens displayed in the text are actual output. Although technology is employed throughout, the authors strive to balance algebraic skill development with the use of technology as an aid to learning and problem solving.

*Annotated Steps* of examples and developments are found throughout the text to help students through the critical stages of problem-solving. Think Boxes (color dashed boxes) are used to enclose steps that, with some experience, many students will be able to perform mentally.

*Applications* throughout the 3<sup>rd</sup> edition give the student substantial experience in modeling and solving real-world problems, fulfilling a primary objective of the text. Over 500 application exercises help convince even the most skeptical student that mathematics is relevant

to everyday life. Chapter Openers are written to highlight interesting applications and an Applications Index is included to help locate applications from particular fields.

*Explore-Discuss Boxes* are interspersed throughout each section. They foster conceptual understanding by asking students to think about a relationship or process before a result is stated. Verbalization of mathematical concepts, processes, and results is strongly encouraged in these investigations and activities.

*Group Activities* at the end of each chapter involve multiple concepts discussed in the chapter. These activities strongly encourage the verbalization of mathematical concepts, results, and processes. All of these special activities are highlighted to emphasize their importance.

[[insert calc icon]] *Foundations for Calculus* icons are used to mark concepts that are especially pertinent to a student's future study of calculus.

[[insert graph icon]] *Interpretation of Graphs* icons are used to mark exercises that ask students to make determinations about equations or functions based on graphs.

## **Key Content Changes**

**Chapter 1 Functions, Graphs, and Models** Functions are now introduced in terms of relations, providing more flexibility in discussing correspondence between sets of objects.

**Chapter 2 Modeling with Linear and Quadratic Functions** Quadratic inequalities are now covered using a more general test point method, so that all nonlinear inequalities are solved using the same method.

**Chapter 3 Polynomial and Rational Functions** Section 3.1 (Polynomial Functions and Models) has been split into two sections, so section 3.2 is now entirely devoted to division of polynomials, including remainder and factor theorems crucial to the study of zeros of

polynomials later in the chapter. The chapter also features a new section (3.6) on direct, inverse, joint, and combined variation. This new section supports the book's emphasis on mathematical modeling.

**Chapter 5 Equations and Inequalities** A new section 5.2 on Systems of Linear Equations in Three Variables was added, while section 5.1 on Systems of Linear Equations in Two Variables was reorganized.

**Chapter 6 Matrices and Determinants** The material on Matrix Solutions to Linear Systems is now found in section 6.1.

## Supplements

**MathZone** McGraw-Hill's MathZone is a complete online tutorial and homework management system for mathematics and statistics, designed for greater ease of use than any other system available. Instructors have the flexibility to create and share courses and assignments with colleagues, adjunct faculty, and teaching assistants with only a few clicks of the mouse. All algorithmic exercises, online tutoring, and a variety of video and animations are directly tied to text-specific materials.

MathZone is completely customizable to suit individual instructor and student needs. Exercises can be easily edited, multimedia is assignable, importing additional content is easy, and instructors can even control the level of help available to students while doing their homework. Students have the added benefit of full access to the study tools to individually improve their success without having to be part of a MathZone course.

MathZone has automatic grading and reporting of easy-to-assign algorithmically generated problem types for homework, quizzes and tests. Grades are readily accessible through

a fully integrated grade book that can be exported in one click to Microsoft Excel, WebCT or BlackBoard.

MathZone Offers:

- Practice exercises, based on the text's end-of-section material, generated in an unlimited number of variations, for as much practice as needed to master a particular topic.
- Subtitled videos demonstrating text-specific exercises and reinforcing important concepts within a given topic.
- NetTutor™ integrating online whiteboard technology with live personalized tutoring via the Internet.
- Assessment capabilities, powered through ALEKS, which provide students and instructors with the diagnostics to offer a detailed knowledge base through advanced reporting and remediation tools.
- Faculty with the ability to create and share courses and assignments with colleagues and adjuncts, or to build a course from one of the provided course libraries.
- An Assignment Builder that provides the ability to select algorithmically generated exercises from any McGraw-Hill math textbook, edit content, as well as assign a variety of MathZone material including an ALEKS Assessment.
- Accessibility from multiple operating systems and internet browsers.

**ALEKS** ALEKS (Assessment and LEarning in Knowledge Spaces) is a dynamic online learning system for mathematics education, available over the Web 24/7. ALEKS assesses



students, accurately determines their knowledge, and then guides them to the material that they are most ready to learn. With a variety of reports, Textbook Integration Plus, quizzes, and homework assignment capabilities, ALEKS offers flexibility and ease of use for instructors.

- ALEKS uses artificial intelligence to determine exactly what each student knows and is ready to learn. ALEKS remediates student gaps and provides highly efficient learning and improved learning outcomes
- ALEKS is a comprehensive curriculum that aligns with syllabi or specified textbooks. Used in conjunction with a McGraw-Hill text, students also receive links to text-specific videos, multimedia tutorials, and textbook pages.
- Textbook Integration Plus allows ALEKS to be automatically aligned with syllabi or specified McGraw-Hill textbooks with instructor chosen dates, chapter goals, homework, and quizzes.
- ALEKS with AI-2 gives instructors increased control over the scope and sequence of student learning. Students using ALEKS demonstrate a steadily increasing mastery of the content of the course.
- ALEKS offers a dynamic classroom management system that enables instructors to monitor and direct student progress towards mastery of course objectives.
- See: [www.aleks.com](http://www.aleks.com)

*Student Solutions Manual* Prepared by Dave Sobecki, the *Student's Solutions Manual* provides comprehensive, worked-out solutions to all of the odd-numbered exercises from the text. The steps shown in the solutions match the style of solved examples in the textbook.

**Video Lectures on Digital Video Disk (DVD)** In the videos, J.D. Herdlick of St. Louis Community College at Meramec introduces essential definitions, theorems, formulas, and problem-solving procedures and then works through selected exercises from the textbook, following the solution methodology employed in the text. In addition, new instructional videos on graphing calculator operations help students master the most essential calculator skills used in the college algebra course. The video series is available on DVD or online as an assignable element of MathZone. The DVDs are closed-captioned for the hearing impaired, subtitled in Spanish, and meet the Americans with Disabilities Act Standards for Accessible Design. Instructors may use them as resources in a learning center, for online courses, and/or to provide extra help to students who require extra practice.

**NetTutor** Available through MathZone, NetTutor is a revolutionary system that enables students to interact with a live tutor over the World Wide Web. NetTutor's web-based, graphical chat capabilities enable students and tutors to use mathematical notation and even to draw graphs as they work through a problem together. Students can also submit questions and receive answers, browse previously answered questions, and view previous live-chat sessions. Tutors are familiar with the textbook's objectives and problem-solving styles.

**CTB (Computerized Test Bank) Online** Available through MathZone, this computerized test bank, utilizing algorithm-based testing software, enables users to create customized exams quickly. This user-friendly program enables instructors to search for questions by topic, format, or difficulty level; to edit existing questions or to add new ones; and to scramble questions and answer keys for multiple versions of the same test. Hundreds of text-

specific open-ended and multiple-choice questions are included in the question bank. Sample chapter tests and final exams in Microsoft Word® and PDF formats are also provided.

***Instructor's Solutions Manual*** Prepared by Dave Sobecki, and available on MathZone, the *Instructor's Solutions Manual* provides comprehensive, worked-out solutions to all exercises in the text. The methods used to solve the problems in the manual are the same as those used to solve the examples in the textbook.

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