COLLEGE ALGEBRA

SECOND EDITION

MARK DUGOPOLSKI

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MARK DUGOPOLSKI
Southeastern Louisiana University

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PREFACE

This text is designed for students who are pursuing further study in mathematics, as well as for those who are not. For those students who will take additional mathematics, the text will provide the skills, understanding, and insights necessary for success in future courses. For those students who will not pursue further mathematics, the extensive emphasis on applications and modeling will demonstrate the usefulness and applicability of mathematics in the world today. Additionally, the focus on problem solving that is a hallmark of this text provides numerous opportunities for students to reason and think their way through problem situations. 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, and to get students to feel this way has been one of my goals in writing this text.

Use of Technology

I place increased emphasis on using graphical, numerical, and analytical points of view in discussions and in solving problems throughout the text. I also provide more 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. While the use of technology is still optional, students who do not use a graphing calculator can still benefit from the technology discussions, as well as from the hundreds of calculator generated graphs that occur in the text. Any graphing utility or computer math package can be used in place of the graphing calculator.

I stress the difference between exact answers and the approximate answers given by a calculator, and discuss the limitations of a calculator graph. I also explain how a calculator drawn graph can assist students to draw or sketch a graph that clearly shows the important features of a function. In the exercises, the graphing calculator is often used as a means of making conjectures about new concepts and relationships. The text instructs students on how to use a graphing calculator, and more importantly, what to use it for and what not to use it for.

Graphing calculator screens generated from a TI-83 graphing calculator are included to give students the idea of the kinds of things a graphing calculator can do to aid in the learning process. But, because of the rapid changes occurring in technology, and the specific differences among brands of calculators, this text does not give specific instructions on how to use the various other machines 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.

Content Changes for the Second Edition

The entire first edition was carefully read for clarity of exposition, and rewritten where necessary. The major changes in this edition are as follows.

Chapter P This chapter contains prerequisite material on real numbers, rules of exponents, factoring, and simplifying expressions. Basic linear, quadratic, and absolute value equations and inequalities are covered in Chapter 1. Some sections from both of these chapters may be omitted depending on the preparation level of the students.

Revised Chapter 3 Quadratic type equations, equations with rational exponents or radicals, and more complicated absolute value equations now occur in Section 3.5, following the theory of polynomial equations, Section 3.4. Because some of these equations are polynomial equations, they will be better understood after the theory of polynomial equations has been studied.

New or Enhanced Features

Linking Concepts This **new feature** is located 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. The idea of this feature is to use a concept from the current section along with concepts from preceding sections (including preceding chapters), and ask questions that help students see the links among various concepts. Some parts of these questions are open-ended, and require somewhat more thought than standard exercises. Answers to this feature are given only in the Instructor's Solutions Manual.

Applications Hundreds of **new exercises** have been added to the exercise sets, and most of them involve applications of real-world situations and often cite data sources. The emphasis of the new exercises is on understanding concepts and relationships.

Exercise Sets The exercise sets have been examined carefully to ensure that the exercises range from easy to challenging, and are arranged in order of increasing difficulty. Many new exercises require a graphing calculator.

Regression Problems Many **new regression problems** have 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.

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Graphing Calculator Exercises Optional exercises that require a graphing calculator are now located in more natural positions in the exercises rather than at the end of the exercise sets as in the first edition. The exercises are optional and are marked with a graphing calculator icon .

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

Web Site A **new Web site** has been established—designed to increase student success in the course by offering section-by-section tutorial help, additional group projects, downloadable programs for TI graphing calculators, and author tips. This icon alerts students at times when this site would be helpful. The site will also be useful to instructors by providing dynamic resources for use in their course.

Continuing Features

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

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, help check student understanding before beginning the exercises, and offer opportunities for writing and/or discussion.

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.

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 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 help students measure their readiness for a classroom test. Instructors may also use them as a model for their own end-of-chapter tests.

Tying It All Together This reviews selected concepts from the present and prior chapters, and requires students to integrate multiple concepts and skills.

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M. D.
Hammond, Louisiana

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