

# PREFACE

## FROM THE AUTHORS

First and foremost, we would like to thank the students and colleagues who have helped us prepare this text. The content and organization of the text is based on an accumulation of our own notes and experiences as teachers. Every day in the classroom our students ask good, probing questions, and every day we seek better ways to convey mathematical concepts. These ideas have found their way from the classroom and into the book.

We originally embarked on this textbook project because we were seeing a lack of student success in courses *above* the level of Beginning and Intermediate Algebra. We wanted to build a better bridge between Intermediate Algebra and college level algebra. Our goal was to use pedagogical features to make the material *stick*. To accomplish this, we employed the following methods.

### ■ Active Learning

First, we believe students retain more of what they learn when they are actively engaged in the classroom. Consequently, as we wrote each section of text, we also wrote accompanying worksheets called Classroom Activities to foster accountability and to encourage classroom participation. Classroom Activities resemble the examples that students encounter in the textbook. The activities can be assigned to individual students, or to pairs or groups of students. Most of the activities have been tested in the classroom with our own students.

### ■ Critical Thinking

Another one of our core goals as teachers is to make students think and process what they learn. Therefore, we emphasized critical thinking and the interpretation of mathematical results. When students obtain an answer to an exercise, we want them to understand what the answer means in the context of the problem. Our examples and exercises often ask students to, “**Interpret the meaning in the context of the problem.**” If students can explain the concepts, their understanding will increase.

### ■ Writing Style

We have each taught developmental mathematics for close to 20 years, and we know and understand our students very well. Our intent is to offer a compassionate voice to the students. Our writing style reflects the language and tone that we use daily within our classrooms. We have created special Tips and Avoiding Mistakes boxes that highlight points we emphasize in our own lectures. Therefore, students who use the book should feel very comfortable with the reading level.

### ■ Real World Applications

Another critical component of the text is the inclusion of contemporary real-world examples and applications. We based examples and applications on information students encounter daily when they turn on the news, read a magazine, or surf the World Wide Web. We incorporated data for students to create mathematical models in the form of functions, equations, and graphs. When students encounter facts or information that is meaningful to them, they will relate better to the material and remember more of what they learn.

### ■ Problem-Solving

Lastly, we crafted our exercise sets to help students solidify their understanding of the content and refine their problem-solving skills. At the beginning of the Practice Exercises, we inserted review problems so that concepts within a chapter could be continually reinforced. We balanced each set of Practice Exercises with both drill-and-practice and conceptual problems that require critical thinking or writing. Throughout the text, you will see exercises with multiple parts, such as (a), (b), (c), etc. These multistep problems are carefully crafted to build problem-solving skills. Each part leads in to the next until a final result is achieved.

## Language of Mathematics

We place special emphasis on the skill of translating mathematical notation to English expressions and vice versa by writing “translating expressions” exercises. We also created challenge exercises in the Expanding Your Skills sections of the exercise sets. Graphing Calculator Exercises also appear. They can be found at the *end* of appropriate exercise sets so that instructors who do not encourage the use of a graphing calculator can skip them.

With these measures, we trust that students will achieve success and gain the foundation they need to move on to higher-level mathematics courses.

## LISTENING TO STUDENTS’ AND INSTRUCTORS’ CONCERNS

Although this is a first edition text, the core material has effectively been revised from our Beginning Algebra text and from our Intermediate Algebra text. These two books have been on the market for over a year, and we have had extensive feedback from users. Some of the instructors who have used our texts have kept user diaries. This has helped us to continue to strengthen the content. In effect, this first edition text is based on second edition material. Our editorial staff has amassed the results of reviewer questionnaires, user diaries, focus groups, and symposia. We have read virtually thousands of pages of reviews. Furthermore, McGraw-Hill symposia have brought faculty together from across the United States to discuss issues and trends in developmental mathematics. These efforts have involved hundreds of faculty and have explored issues such as content, readability, and even the aesthetics of page layout.

## WHAT SETS THIS BOOK APART?

While all core content is covered in this textbook, the organization is a departure from common practice in some ways. However, we feel that the aspects of the organization that make it unique are factors that will contribute directly to students’ success.

### Chapter R

Chapter R is a reference chapter. We designed it to help students reacquaint themselves with the fundamentals of fractions and geometry. This chapter also addresses study skills and helpful hints to use the resources provided in the text and supplements.

### Graphing and Functions

The graphical interpretation of algebra is a critical skill that carries through to upper level mathematics courses. However, students often have difficulty with graphing. Therefore, we offer graphing on two levels. In Chapter 3, we present concepts related to the “beginning algebra” level of graphing. This includes an introduction to a rectangular coordinate system, identifying linear equations in two variables, and finding the slope of a line. We graph linear equations using a table of points, using the  $x$ - and  $y$ -intercepts, and using the slope-intercept form. At this level, we also find an equation of a line given its slope and  $y$ -intercept.

In Chapter 7, we review the “beginning algebra” level of graphing and then we present the “intermediate algebra” level of graphing. We give the point-slope formula

to find an equation of a line and then follow up with applications of linear equations and modeling.

We devote the latter part of Chapter 7 to functions, beginning with the general concept of a relation. We introduce the graphs of six basic functions to initiate a “repertoire” of functions that students can carry with them to college-level algebra courses. After introducing functions in Chapter 7, we take a functional approach throughout the remainder of the text. This includes work with polynomial, quadratic, radical, rational, exponential, and logarithmic functions.

## Factoring

After factoring out the greatest common factor, we present two methods for factoring trinomials—the grouping method and the trial-and-error method. In both cases, we teach the most general case first (that is, trinomials with a leading coefficient *not* equal to 1). The reason is that we always want the student to consider the leading coefficient and its factors whether it’s a 1 or any other number. Thus, when students take the product of the inner terms and the product of the outer terms, the factors of the leading coefficient always come into play.

We recognize that our approach to factoring trinomials is unusual. However, because we do not present the easier case first, students will not default to the easier case when it doesn’t apply. When students find a method that’s easy—like finding two numbers that multiply to “*c*” and add up to “*b*”—students may tune out the fact that it doesn’t work all the time. We want to prevent students from thinking that  $6x^2 + 19x + 15$  is not factorable because no two factors of 15 add up to 19.

In Section 5.6, “General Factoring Summary,” we first review and summarize the techniques learned up to that point. Then we present advanced techniques such as using substitution in factoring and grouping three terms with one term. These advanced techniques are denoted with the header “Part II” both in the text and in the exercises (see page 348, Concept 3, and page 352). The Practice Exercises in Section 5.6 are divided into two groups, Part I and Part II. This makes it easy for instructors to identify the level of the exercises. Those instructors who only want to cover the Beginning Algebra level of factoring can assign only the Part I exercises. The instructors who want to cover the Intermediate Algebra level of factoring can assign both Part I and Part II.

## Inequalities

A student who completes Intermediate Algebra should be able to recognize and solve a variety of equations and inequalities. However, identifying different types of equations and inequalities and knowing what approach to take is a skill that is often overlooked. We designed Chapter 9 as a synthesis chapter for students to solve all kinds of equations and inequalities appropriate at this level. Our exercise sets involve a “mixture” of problem types for students to recognize and solve. While we present traditional methods for solving inequalities, we also show the test point method. All of the inequalities in this chapter can be solved by solving the related equation and testing regions on the number line.

## Calculator Usage

The use of a scientific or graphing calculator often inspires great debate among faculty teaching developmental mathematics. Our Calculator Connections boxes offer screen shots and some keystrokes to support applications where a calculator might

enhance learning. Our approach is to use a calculator as a verification tool *after* analytical methods have been applied. As you move into the Intermediate Algebra level of the text, and as more coverage is given to graphing and functions, you will see a gradual transition into more calculator coverage. Graphing calculator exercises are provided at the end of exercise sets in appropriate sections. However, the Calculator Connections boxes and graphing calculator exercises are self-contained units and may be employed or easily omitted at the recommendation of the instructor.

### Beginning Algebra Review

For students who place into Intermediate Algebra, we have provided concise review sections at the back of the text. Each section of the review corresponds with a chapter from the first portion of the text, that is, Chapters 1–6. Each section provides exercises that target the main points of the corresponding chapter.

### SUGGESTIONS WELCOME!

Many features of this book, and many refinements in the writing, illustrations, and content, came about because of suggestions and questions from instructors and their students. We invite your comments with regard to this textbook as we work to further refine and shape its contents.

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### ACKNOWLEDGMENTS AND REVIEWERS

The development of this textbook would never have been possible without the creative ideas and constructive feedback offered by many reviewers. We are especially thankful to the following instructors for their valuable feedback and careful review of the manuscript.

Randall Allbritton, *Daytona Beach Community College*  
 Wesley L. Anderson, *Northwest Vista College*  
 Shirley M. Brown, *Weatherford College*  
 Nate Callender, *Dyersburg State Community College*  
 Marc Campbell, *Daytona Beach Community College*  
 James D. Chandler Jr., *Tidewater Community College*  
 Rhoderick Fleming, *Wake Technical Community College*  
 David French, *Tidewater Community College*  
 Becky Hubiak, *Tidewater Community College*  
 Laura Kalbaugh, *Wake Technical Community College*  
 Michael Kirby, *Tidewater Community College*  
 Nickos Lambros, *DeVry University–Dupage Campus*  
 Kirsten Lollis, *San Diego City College*  
 Jean P. Millen, *Georgia Perimeter College*

Marilyn Peacock, *Tidewater Community College*  
 Elizabeth Sievers, *College of DuPage*  
 Pamela S. Webster, *Texas A&M University–Commerce*  
 Marilyn A. Zopp, *McHenry County College*

In addition, we would also like to thank the following reviewers of *Beginning Algebra*, *Intermediate Algebra*, and *Algebra for College Students*. Their suggestions were also helpful in developing this manuscript:

Marwan Abu-Sawwa, *Florida Community College at Jacksonville*  
 Jannette Avery, *Monroe Community College*  
 Pam Baenziger, *Kirkwood Community College*  
 Jo Battaglia, *Pennsylvania State University*  
 Mary Kay Best, *Coastal Bend College*  
 Paul Blankenship, *Lexington Community College*  
 James C. Boyett, *Arkansas State University, Beebe*  
 Debra D. Bryant, *Tennessee Technological University*  
 Connie L. Buller, *Metropolitan Community College, Omaha*  
 Gerald F. Busald, *San Antonio College*  
 Jimmy Chang, *St. Petersburg College*  
 Oiyin Pauline Chow, *Harrisburg Area Community College*  
 Elizabeth Condon, *Queens Community College*  
 Pat C. Cook, *Weatherford College*  
 Jacqueline Coomes, *Eastern Washington University*  
 Julane Crabtree, *Johnson County Community College*  
 Cynthia M. Craig, *Augusta State University*  
 Katherine W. Creery, *University of Memphis*  
 Bettyann Daley, *University of Delaware*  
 Antonio David, *Del Mar College*  
 Andres Delgado, *Orange County Community College*  
 Irene Duranczyk, *Eastern Michigan University*  
 Dennis C. Ebersole, *Northampton Community College*  
 James M. Edmondson, *Santa Barbara City College*  
 Robert A. Farinelli, *Community College of Allegheny County, Boyce*  
 Pat Foard, *South Plains College*  
 Toni Fountain, *Chattanooga State Technical Community College*  
 Dr. Paul F. Foutz, *Temple College*  
 Chris J. Gardiner, *Eastern Michigan University*  
 Jacqueline B. Giles, *Houston County Community College*  
 Pamela Heard, *Langston University*  
 Celeste Hernandez, *Richland College*  
 Julie Hess, *Grand Rapids Community College*  
 Kayana Hoagland, *South Puget Sound Community College*  
 Bruce Hoelter, *Raritan Valley Community College*

Rosalie Hojegan, *Possaic County Community College*  
Lori Holdren, *Manatee Community College*  
Glenn Hunt, *Riverside Community College*  
Sarah Jackman, *Richland College*  
Donald L. James, *Montgomery College*  
Nancy R. Johnson, *Manatee Community College*  
Steven Kahn, *Anne Arundel Community College*  
Richard Karwatka, *University of Wisconsin, Parkside*  
Jane Keller, *Metropolitan Community College*  
William A. Kincaid, Sr., *Wilmington College*  
Jeff A. Koleno, *Lorain County Community College*  
Kathryn Kozak, *Coconino Community College*  
Betty J. Larson, *South Dakota State University*  
Mary M. Leeseberg, *Manatee Community College*  
Deann Leoni, *Edmonds Community College*  
Deanna Li, *North Seattle Community College*  
Pamela A. Lipka, *University of Wisconsin*  
J. Robert Malena, *Community College of Allegheny County—South Campus*  
Ana M. Mantilla, *Pima Community College*  
Maria M. Maspons, *Miami Dade Community College*  
Timothy McKenna, *University of Michigan, Dearborn*  
Debbie K. Millard, *Florida Community College*  
Jean P. Millen, *Georgia Perimeter College*  
Mary Ann Misko, *Gadsden State Community College*  
Jeffery Mock, *Diablo Valley College*  
Stephen E. Mussack, *Moorpark College*  
Cameron Neal, Jr., *Temple College*  
Sue Nolen, *Mesa Community College*  
Timothy Norfolk, *University of Akron*  
Linda Padilla, *Joliet Junior College*  
Don Piele, *University of Wisconsin, Parkside*  
Bernard J. Pina, *Dona Ana Branch Community College—NMSU*  
Rita Beth Pruitt, *South Plains College*  
Nancy C. Ressler, *Oakton Community College*  
Reynaldo Rivera, Jr., *Estrella Mountain Community College*  
Mary Romans, *Kent State University*  
Frances Rosamond, *National University*  
Katalin Rozsa, *Mesa Community College*  
Elizabeth Russell, *Glendale Community College*  
Fred Safier, *City College of San Francisco*  
Ned W. Schillow, *Lehigh Carbon Community College*  
Mary Lee Seitz, *Erie Community College*  
Cindy Shaber, *Boise State University*  
Lisa Sheppard, *Lorain County Community College*

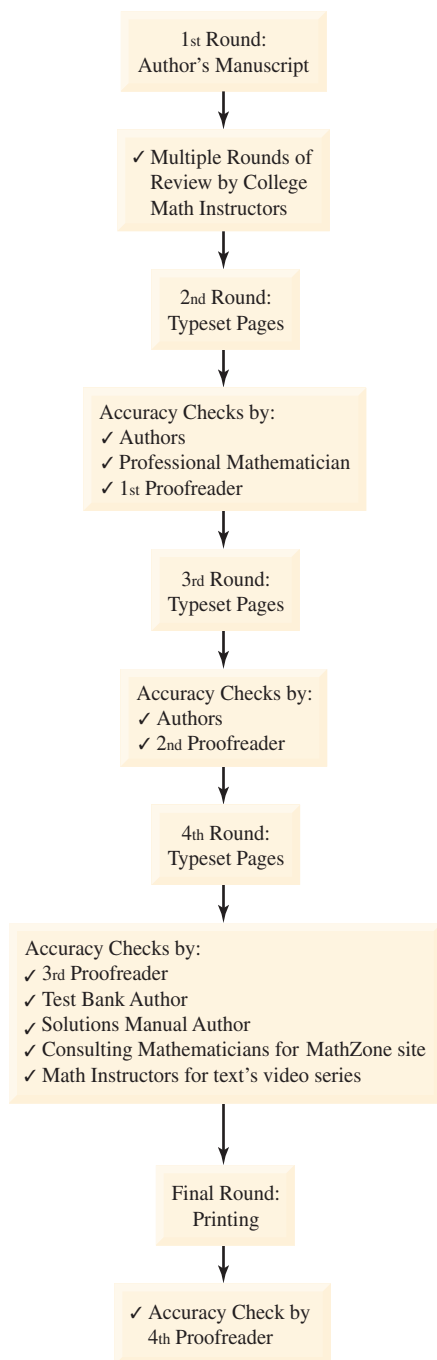
Donna Sherrill, *Arkansas Technical University*  
 Bruce Sisko, *Belleville Area College (Southwestern Illinois College)*  
 Carolyn R. Smith, *Washington State University*  
 Sandra L. Spain, *Thomas Nelson Community College*  
 Brian Starr, *National University*  
 Daryl Stephens, *East Tennessee State University*  
 Dr. Bryan Stewart, *Tarrant County College*  
 Elizabeth A. Swift, *Cerritos College*  
 Irving C. Tang, *Oklahoma State University, Oklahoma City*  
 Alexis Thurman, *County College of Morris*  
 Peggy Tibbs, *Arkansas Technical University*  
 Dr. Lee Topham, *Kingwood College*  
 Dr. Roy N. Tucker, *Palo Alto College*  
 Jeannine G. Vigerust, *New Mexico State University*  
 Sandra Vrem, *College of the Redwoods*  
 John C. Wenger, *Harold Washington College*  
 Charles M. Wheeler, *Montgomery College*  
 Ethel R. Wheland, *University of Akron*  
 Denise A. Widup, *University of Wisconsin, Parkside*  
 Thomas L. Wolters, *Muskegon Community College*

Special thanks go to David French of Tidewater Community College for preparing the *Instructor's Solutions Manual* and the *Student's Solutions Manual*, to Sherri Messersmith of College of DuPage for her appearance in and work on the video series, and to Lauri Semarne and Cindy Trimble for their work in ensuring accuracy in the content.

In addition we are forever grateful to the many people behind the scenes at McGraw-Hill who have made this project possible. Our sincerest thanks to Erin Brown, the best editor in the business, thanks for keeping the train on the track. To Liz Haefele, David Dietz, Bill Barter, and Michael Lange for believing in us and supporting us for many years. To Cindy Schmerbach and April Southwood for their patience during production and to Steve Stembridge for his creative ideas promoting our efforts. We further appreciate the hard work of Pat Steele.

Finally, we give special thanks to all the students and instructors who use *Beginning and Intermediate Algebra* in their classes.

Julie Miller and Molly O'Neill



## A COMMITMENT TO ACCURACY

You have a right to expect an accurate textbook, and McGraw-Hill invests considerable time and effort to make sure that we deliver one. Listed below are the many steps we take to make sure this happens.

## OUR ACCURACY VERIFICATION PROCESS

### First Round

Step 1: Numerous **college math instructors** review the manuscript and report on any errors that they may find, and the authors make these corrections in their final manuscript.

### Second Round

Step 2: Once the manuscript has been typeset, the **authors** check their manuscript against the first page proofs to ensure that all illustrations, graphs, examples, exercises, solutions, and answers have been correctly laid out on the pages, and that all notation is correctly used.

Step 3: An outside, **professional mathematician** works through every example and exercise in the page proofs to verify the accuracy of the answers.

Step 4: A **proofreader** adds a triple layer of accuracy assurance in the first pages by hunting for errors, then a second, corrected round of page proofs is produced.

### Third Round

Step 5: The **author team** reviews the second round of page proofs for two reasons: 1) to make certain that any previous corrections were properly made, and 2) to look for any errors they might have missed on the first round.

Step 6: A **second proofreader** is added to the project to examine the new round of page proofs to double check the author team's work and to lend a fresh, critical eye to the book before the third round of paging.

### Fourth Round

Step 7: A **third proofreader** inspects the third round of page proofs to verify that all previous corrections have been properly made and that there are no new or remaining errors.

Step 8: Meanwhile, in partnership with **independent mathematicians**, the text accuracy is verified from a variety of fresh perspectives:

- The **test bank author** checks for consistency and accuracy as they prepare the computerized test item file.
- The **solutions manual author** works every single exercise and verifies their answers, reporting any errors to the publisher.
- A **consulting group of mathematicians**, who write material for the text's MathZone site, notifies the publisher of any errors they encounter in the page proofs.
- A video production company employing **expert math instructors** for the text's videos will alert the publisher of any errors they might find in the page proofs.

### Final Round

Step 9: The **project manager**, who has overseen the book from the beginning, performs a **fourth proofread** of the textbook during the printing process, providing a final accuracy review.

⇒ What results is a mathematics textbook that is as accurate and error-free as is humanly possible, and our authors and publishing staff are confident that our many layers of quality assurance have produced textbooks that are the leaders of the industry for their integrity and correctness.