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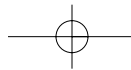
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20. U.S. life expectancy has been steadily increasing (see Exercise 15 in Section 2.1 and data file for LIFEXEC). The following graph shows the roughly linear trends for both males and females over more than three decades.

Trends in U.S. Life Expectancy by Sex, 1970-2005

Life expectancy (in years)

Source: U.S. Bureau of the Census.

a. According to these data, what is the life expectancy of a female born in 1970? Of a male born in 2005?

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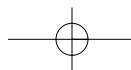
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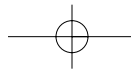
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of students surveyed said it made them better prepared for tests. *



*Based upon 7,000 responses to student surveys in academic year 2006-2007





FOURTH EDITION

EXPLORATIONS IN COLLEGE ALGEBRA

LINDA ALMGREN KIME
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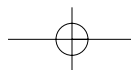
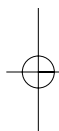
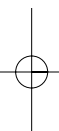
Hubert Hohn *Massachusetts College of Art*

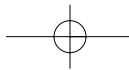
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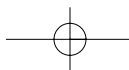
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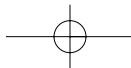
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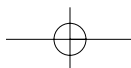
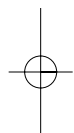
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To our students, who inspired us.



A Letter from a Student

My name is Lexi Fournier and I am a freshman here at Pitt. This semester I am enrolled in the Applied Algebra course using "Explorations in College Algebra." Before coming to Pitt, I had taken numerous math courses varying from algebra to calculus, all of which produced frustration, stress, and a detestation for math as a subject. When I was told that I was required to take a math course here, I was livid. I am a pre-law and creative writing major; why do I need math? My adviser calmed me by informing me of this new math class aimed at teaching non-math/science majors the basic skills they will need in everyday life.

At first I was skeptical, but I'm writing to you now to emphatically recommend this course. What I have learned thus far in this course have been realistic math skills presented in a "left brain" method that fosters confidence and motivation. For once in my career as a student, math is relatable. The concepts are clear and realistic (as opposed to the abstract, amorphous topics addressed in my earlier math classes). I look forward to this class. I enjoy doing my homework and projects because I feel that the lessons are applicable to my life and my future and because I feel empowered by my understanding.

This course is a vital addition to the math department. It has altered my view on the subject and stimulated an appreciation for what I like to call "everyday math."

It is my belief that many students will find the class as encouraging and helpful as I have. Thank you for your attention.

Sincerely,

Lexi Fournier
Student, University of Pittsburgh

P R E F A C E

This text was born from a desire to reshape the college algebra course, to make it relevant and accessible to all of our students. Our goal is to shift the focus from learning a set of discrete mechanical rules to exploring how algebra is used in the social and physical sciences. Through connecting mathematics to real-life situations, we hope students come to appreciate its power and beauty.

Guiding Principles

The following principles guided our work.

- Develop mathematical concepts using real-world data and questions.
- Pose a wide variety of problems designed to promote mathematical reasoning in different contexts.
- Make connections among the multiple representations of functions.
- Emphasize communication skills, both written and oral.
- Facilitate the use of technology.
- Provide sufficient practice in skill building to enhance problem solving.

Evolution of Explorations in College Algebra

The fourth edition of *Explorations* is the result of a 15-year long process. Funding by the National Science Foundation enabled us to develop and publish the first edition, and to work collaboratively with a nationwide consortium of schools. Faculty from selected schools in the consortium continued to work with us on the second, third, and now the fourth editions. During each stage of revision we solicited extensive feedback from our colleagues, reviewers and students.

Throughout the text, families of functions are used to model real-world phenomena. After an introductory chapter on data and functions, we first focus on linear and exponential functions, since these are the two most commonly used mathematical models. We then discuss logarithmic, power, quadratic, and polynomial functions and finally turn to ways to extend and combine all the types of functions we've studied to create new functions.

The text adopts a problem-solving approach, where examples and exercises lie on a continuum from open-ended, nonroutine questions to problems on algebraic skills. The materials are designed for flexibility of use and offer multiple options for a wide range of skill levels and departmental needs. The text is currently used in small classes, laboratory settings, and large lectures, and in both two- and four-year institutions.

Special Features and Supplements

An instructor is free to choose among a number of special features. The Instructor's Teaching Manual provides support for using these features and includes sample test questions. The Instructor's Solutions Manual contains answers to the even exercises and even problems in the Chapter Reviews. Both manuals are available free for adopters either online at www.wiley.com/college/kimeclark or in hardcopy by contacting your local Wiley representative.

Exploring Mathematical Ideas



Explorations These are open-ended investigations designed to be used in parallel with the text. They appear at the end of each chapter and in two chapter-length Extended Explorations.

New! Chapter Review: Putting It All Together Each review contains problems that apply all of the basic concepts in the chapter. The answers to the odd-numbered problems are in the back of the text.

Check Your Understanding A set of mostly true/false questions at the end of each chapter (with answers in the back of the text) offer students a chance to assess their understanding of that chapter's mathematical ideas.



SOMETHING TO THINK ABOUT

Something to Think About Provocative questions, posed throughout the text, can be used to generate class discussion or for independent inquiry.

60-Second Summaries Short writing assignments in the exercises and Explorations ask students to succinctly summarize their findings.



Readings A variety of articles related to topics covered in the text are available on the course website at www.wiley.com/college/kimeclark.

Using Technology

COURSE WEBSITE

Technology is not required to teach this course. However, we provide numerous resources, described below, for teaching with technology that can be downloaded from the course website at www.wiley.com/college/kimeclark.

Graphing Calculator Manual The manual offers step-by-step instructions for using the TI83/TI84 family of calculators that are coordinated with the chapters in the text. It is free on the course website or at a discount when packaged in hardcopy with the text.



Interactive Software for Mac and PC Programs for visualizing mathematical concepts, simulations, and practice in skill building are available on the course website. They may be used in classroom demonstrations or a computer lab, or downloaded for student use at home.



Excel and TI83/TI84 Graph Link Files Data files containing all the major data sets used in the text are available on the course website.

Practice in Skill Building

Algebra Aerobics These collections of skill-building practice problems are integrated throughout each chapter. Answers for all Algebra Aerobics problems are in the back of the text.

WileyPLUS This is a powerful online tool that provides a completely integrated suite of teaching and learning resources in one easy-to-use website. It offers an online assessment system with full gradebook capabilities, which contains algorithmically generated skill-building questions from the Algebra Aerobics problems and the exercises in each chapter. Faculty can view the online demo at www.wiley.com/college/wileyplus.

The Fourth Edition

Overall Changes

Extensive faculty reviews guided our work on the fourth edition. The sequence of the chapters remains the same as in the third edition, but we have included

- New chapter reviews, called “Putting It All Together,” with problems that bring together the major concepts of the chapter.
- A relocation of exercises from the end of the chapter to the end of each section.
- Expanded coverage of several topics, including function notation, range and domain, piecewise linear functions (including absolute value and step functions), rational functions, composition, and inverse functions.
- Extensive updates of the data sets.
- Revisions to many chapters for greater clarity.
- Many new problems and exercises, ranging from basic algebraic manipulations to real-world applications.

Detailed Changes

CHAPTER REVIEWS: “PUTTING IT ALL TOGETHER” appear at the end of each chapter.

CHAPTER 1: Making Sense of Data and Functions has a new section on the language of functions, with expanded coverage of function notation, domain, and range. Boxes have been added to highlight important concepts.

CHAPTER 2: Rates of Change and Linear Functions has a new subsection on piecewise linear functions, including the absolute value function and step functions.

EXTENDED EXPLORATION: Looking for Links between Education and Earnings uses an updated data set from the U.S. Census about 1000 individuals.

CHAPTER 5: Growth and Decay: An Introduction to Exponential Functions has an expanded discussion on constructing an exponential function given its doubling time or half-life.

CHAPTER 7: Power Functions has an added discussion of asymptotes for negative integer power functions.

CHAPTER 8: Quadratics, Polynomials, and Beyond has changed the most. The old Section 8.6 has been expanded and broken up into three sections. Section 8.6, “New Functions from Old,” discusses the effect of stretching, compressing, shifting, reflecting, or rotating a function. Section 8.7, “Combining Two Functions,” includes the algebra of functions and an expanded subsection on rational functions. Section 8.8, “Composition and Inverse Functions,” extends the coverage of these topics.

Acknowledgments

We wish to express our appreciation to all those who helped and supported us during this extensive collaborative endeavor. We are grateful for the support of the National Science Foundation, whose funding made this project possible, and for the generous help of our program officers then, Elizabeth Teles and Marjorie Enneking. Our original Advisory Board, especially Deborah Hughes Hallett and Philip Morrison, and our original editor, Ruth Baruth provided invaluable advice and encouragement.

Over the last 15 years, through five printings (including a rough draft and preliminary edition), we worked with more faculty, students, TAs, staff, and administrators than we can possibly list here. We are deeply grateful for supportive colleagues at our own University. The generous and ongoing support we received from Theresa Mortimer, Patricia Davidson, Mark Pawlak, Maura Mast, Dick Cluster, Anthony Beckwith, Bob Seeley, Randy Albelda, Art MacEwan, Rachel Skvirsky, Brian Butler, among many others, helped to make this a successful project.

x PREFACE

We are deeply indebted to Ann Ostberg and Rebecca Hubiak for their dedicated search for mathematical errors in the text and solutions, and finding (we hope) all of them. A text designed around the application of real-world data would have been impossible without the time-consuming and exacting research done by Patrick Jarrett, Justin Gross, and Jie Chen. Edmond Tomastik and Karl Schaffer were gracious enough to let us adapt some of their real-world examples in the text.

One of the joys of this project has been working with so many dedicated faculty who are searching for new ways to reach out to students. These faculty, and their teaching assistants and students all offered incredible support, encouragement, and a wealth of helpful suggestions. In particular, our heartfelt thanks to members of our original consortium: Sandi Athanassiou and all the wonderful TAs at University of Missouri, Columbia; Natalie Leone, University of Pittsburgh; Peggy Tibbs and John Watson, Arkansas Technical University; Josie Hamer, Robert Hoburg, and Bruce King, past and present faculty at Western Connecticut State University; Judy Stubblefield, Garden City Community College; Lida McDowell, Jan Davis, and Jeff Stuart, University of Southern Mississippi; Ann Steen, Santa Fe Community College; Leah Griffith, Rio Hondo College; Mark Mills, Central College; Tina Bond, Pensacola Junior College; and Curtis Card, Black Hills State University.

The following reviewers' thoughtful comments helped shape the fourth edition: Mark Ginn, Appalachian State; Ernie Solheid, California State University, Fullerton; Pavlov Rameau, Florida International University; Karen Becker, Fort Lewis College; David Phillips, Georgia State University; Richard M. Aron and Beverly Reed, Kent State University; Nancy R. Johnson, Manatee Community College; Lauren Fern, University of Montana; Warren Bernard, Linda Green, and Laura Younts, Santa Fe Community College; Sarah Clifton, Southeastern Louisiana University; and Jonathan Prewett, University of Wyoming.

We are especially indebted to Laurie Rosatone at Wiley, whose gracious oversight helped to keep this project on track. Particular thanks goes to our new editors Jessica Jacobs, Acquisitions Editor; John-Paul Ramin, Developmental Editor; Michael Shroff, Assistant Editor; and their invaluable assistant Jeffrey Benson. It has been a great pleasure, both professionally and personally, to work with Maddy Lesure on her creative cover design and layout of the text. "*Explorations*" and the accompanying media would never have been produced without the experienced help from Sandra Dumas, Dorothy Sinclair, and Stefanie Liebman. Kudos to Jan Fisher at Publication Services. Throughout the production of this text, her cheerful attitude and professional skills made her a joy to work with. Over the years many others at Wiley have been extraordinarily helpful in dealing with the myriad of endless details in producing a mathematics textbook. Our thanks to all of them.

Our families couldn't help but become caught up in this time-consuming endeavor. Linda's husband, Milford, and her son Kristian were invaluable scientific and, more importantly, emotional resources. They offered unending encouragement and sympathetic shoulders. Judy's husband, Gerry, became our Consortium lawyer, and her daughters, Rachel, Caroline, and Kristin provided support, understanding, laughter, editorial help and whatever was needed. Beverly's husband, Dan, was patient and understanding about the amount of time this edition took. Her daughters Bridget and Megan would call from college to cheer her on and make sure she was not getting too stressed! All our family members ran errands, cooked meals, listened to our concerns, and gave us the time and space to work on the text. Our love and thanks.

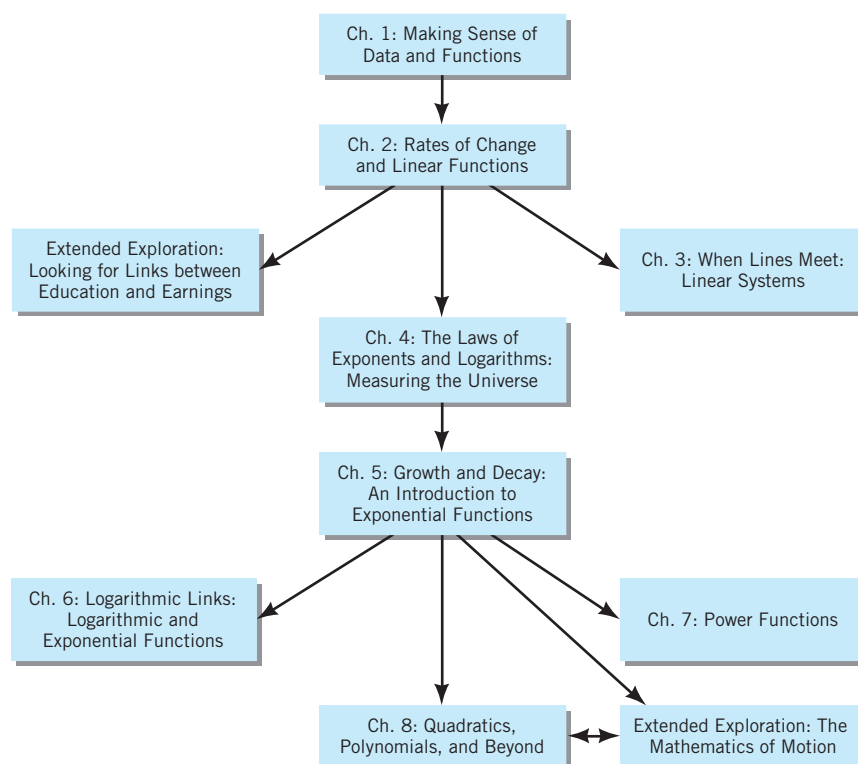
Finally, we wish to thank all of our students. It is for them that this book was written.

Linda, Judy, and Bev

P.S. We've tried hard to write an error-free text, but we know that's impossible. You can alert us to any errors by sending an email to math@wiley.com. Be sure to reference *Explorations in College Algebra*. We would very much appreciate your input.

COVERING THE CONTENTS

The following flow chart suggests some alternative paths through the chapters that have worked successfully for others.



The straight vertical path through Chapters 1, 2, 4, 5, and 8, covering linear, exponential, quadratic and other polynomial functions, indicates the core content of the text. You may choose to cover these chapters in depth, spending time on the explorations, readings and student discussions, writing, and presentations. Or you may pick up the pace and include as many of the other chapters and Extended Explorations as is appropriate for your department's needs.

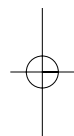
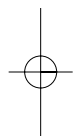


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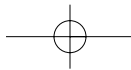
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