SIXTH EDITION

FINITE MATHEMATICS WITH APPLICATIONS

FOR BUSINESS AND SOCIAL SCIENCES

INSTRUCTOR'S FREE C

MIZRAHI ○ SULLIVAN

FINITE MATHEMATICS WITH APPLICATIONS

FOR BUSINESS AND SOCIAL SCIENCES
SIXTH EDITION

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PREFACE

The first edition of this book was published in 1973. At that time our purpose was to present a low-level approach to the mathematics required in business and the social sciences, giving emphasis to real-world applications from these fields. In subsequent editions this remained our purpose, as it does in this, the sixth edition. However, in this edition we have enlarged our range of applications to include applications to computers and the field of computer science.

ORGANIZATION

This edition is divided into three independent parts: Linear Algebra, Probability, and Discrete Mathematics. Depending on the interests of the audience, an instructor can start a course at the beginning of any of the three parts. The chart on page v illustrates the interaction of the chapters.

Part One, Linear Algebra, contains five chapters: Chapter 1 lays the foundation and is considered a review chapter. Chapter 2 presents a discussion of matrices, beginning with systems of linear equations. Chapters 3 and 4 concentrate on linear programming and applications. Chapter 5 contains some of the mathematics found in finance.

Part Two, Probability, contains six chapters. Chapter 6 introduces sets and elementary counting techniques. Chapter 7 deals with probability. Chapter 8 examines more topics in probability, conditional probability, independence, Bayes' formula, the binomial probability model, random variables, and expectation. Chapter 9 provides an introduction to statistics; Chapter 10 discusses Markov chains. Chapter 11 provides an application to game theory.

Part Three, Discrete Mathematics, contains three chapters. Chapter 12 discusses logic and its application to circuit design. Chapter 13 introduces relations, functions, sequences, and mathematical induction, emphasizing each one's role in computer science. Chapter 14 presents an introduction to graphs and networks.

PREREQUISITES

We have made every effort to keep the formal prerequisites to a minimum. We assume only a first year of high school algebra. We review in Chapter 1 those topics that are typically weak spots for students.

CHANGES TO THE SIXTH EDITION

Among the changes in this edition, the following are the most significant.

The stock of exercises from the previous editions has been significantly expanded. Problems at the end of most sections are divided into four parts, A, B, C, and Applications.

Chapter 1: The section on straight lines is rewritten. The section on systems of equations is moved to Chapter 2.

Chapter 2: The section on solving of linear systems is completely rewritten. By starting with a careful presentation of linear equations in two and three variables, the idea and use of matrices becomes a more easily assimilable idea.

The concept of a parameter is discussed in Section 2.1 to enable the reader to better understand the idea of infinite solutions.

Chapter 3: Minor changes.

Chapter 4: Minor changes.

Chapter 5: The text has been completely rewritten with an emphasis on the hand calculator to solve problems, even though tables are included in the appendix. Geometric Series are used to derive some of the formulas.

Chapter 6: *Sets: Counting Techniques.* This is Chapter 6 from the fifth edition plus some of the material involving advanced counting techniques from Chapter 8 in the fifth edition.

Chapter 7: *Introduction to Probability.* This chapter is part of Chapter 7 from the fifth edition except that we stop at conditional probability.

Chapter 8: The discussion of this chapter starts with conditional probability and ends with expectation. The only new material is the section on random variables. As a result, we use random variables to introduce expectation.

Chapter 9: Section 9.3, Other Graphical Techniques, is new. Here we teach students to use pie charts and bar graphs in presenting data.

Chapter 10: Section 10.5, Solving Nonstrictly Determined Matrix Games Using Linear Programming, is entirely new. It ties together the chapter on linear programming and games.

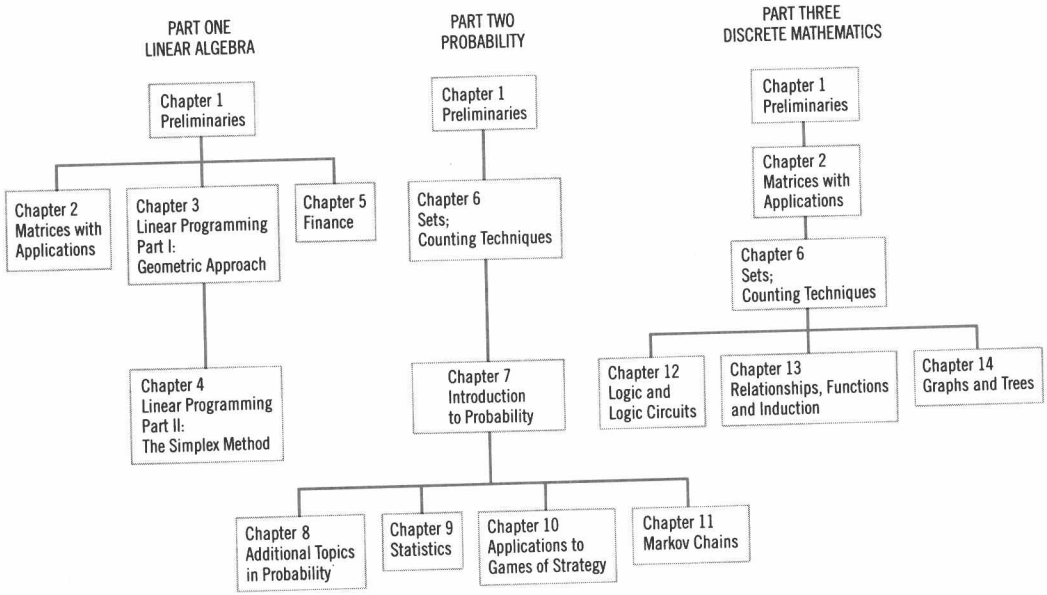
Chapter 11: Minor changes.

Chapter 12: Minor changes.

Chapter 13: Part of the material included in the previous edition has been removed to make the chapter more readable and in tune with the preceding chapters.

FEATURES

* More than 400 detailed examples, clearly illustrating concepts and techniques.
* The text features a rich selection of applications from many disciplines. This edition includes several new applications to business.
* Procedures and processes for solving problems are given as a series of steps and are prominently displayed in boxes. See, for example, page 154 and page 384.
* More than 2800 exercises, ranging from drill to challenging. Many of these are applied-type problems.
* Each chapter contains a review featuring a list of Important Terms and Formulas from the chapter, True-False and Fill-in-the-Blank Questions, a collection of Review Exercises, and, when appropriate, Mathematical Questions taken from CPA, CMA, and actuary exams.
* Important definitions are presented in boldface; formulas and theorems are placed in a box, screened in color.
* Answers to the Odd-Numbered Problems appear at the end of the book.
* Flowcharts are utilized whenever possible to outline procedures. See, for example, page 196.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SUPPLEMENTS

* An Instructor's Manual presents worked-out solutions to both the even and the odd-numbered problems.
* A Student Solutions Manual contains worked-out solutions to the odd-numbered problems.
* Computer-Generated Test Bank. This microcomputer testing system contains questions prepared by the authors and is available for Macintosh, IBM-PC, and for most compatibles.

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We assume equal responsibility for the book's strengths and weaknesses, and welcome comments and suggestions for its improvement.

Abe Mizrahi

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ABOUT THE AUTHORS

Abe Mizrahi, received his doctorate in mathematics from the Illinois Institute of Technology in 1965. He is currently Professor of Mathematics at Indiana University Northwest. Professor Mizrahi and Professor Sullivan are coauthors of *Mathematics for Business and Social Sciences,* fourth edition, John Wiley & Sons, Inc., 1988, as well as *Calculus with Analytic Geometry,* third edition, Wadsworth Publishing Company, 1990. Dr. Mizrahi is a member of the Mathematics Association of America. Articles he has written explore topics in math education and the applications of mathematics to economics. Professor Mizrahi has served on many CUPM committees and was a panel member on the CUPM Committee on Applied Mathematics in the Undergraduate Curriculum. Professor Mizrahi is a recipient of many NSF grants and has been a consultant to a number of businesses and federal agencies.

Michael Sullivan, received his doctorate in mathematics from the Illinois Institute of Technology in 1967. Since 1965 he has been teaching at Chicago State University in the Department of Mathematics and Computer Science, holding the rank of professor. Dr. Sullivan is a member of the American Mathematical Society, the Mathematics Association of America, and Sigma Xi. He has served on CUPM curriculum committees and is a member of the Illinois Section MAA High School Lecture Committee.

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PART ONE

LINEAR ALGEBRA

1

PRELIMINARIES

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