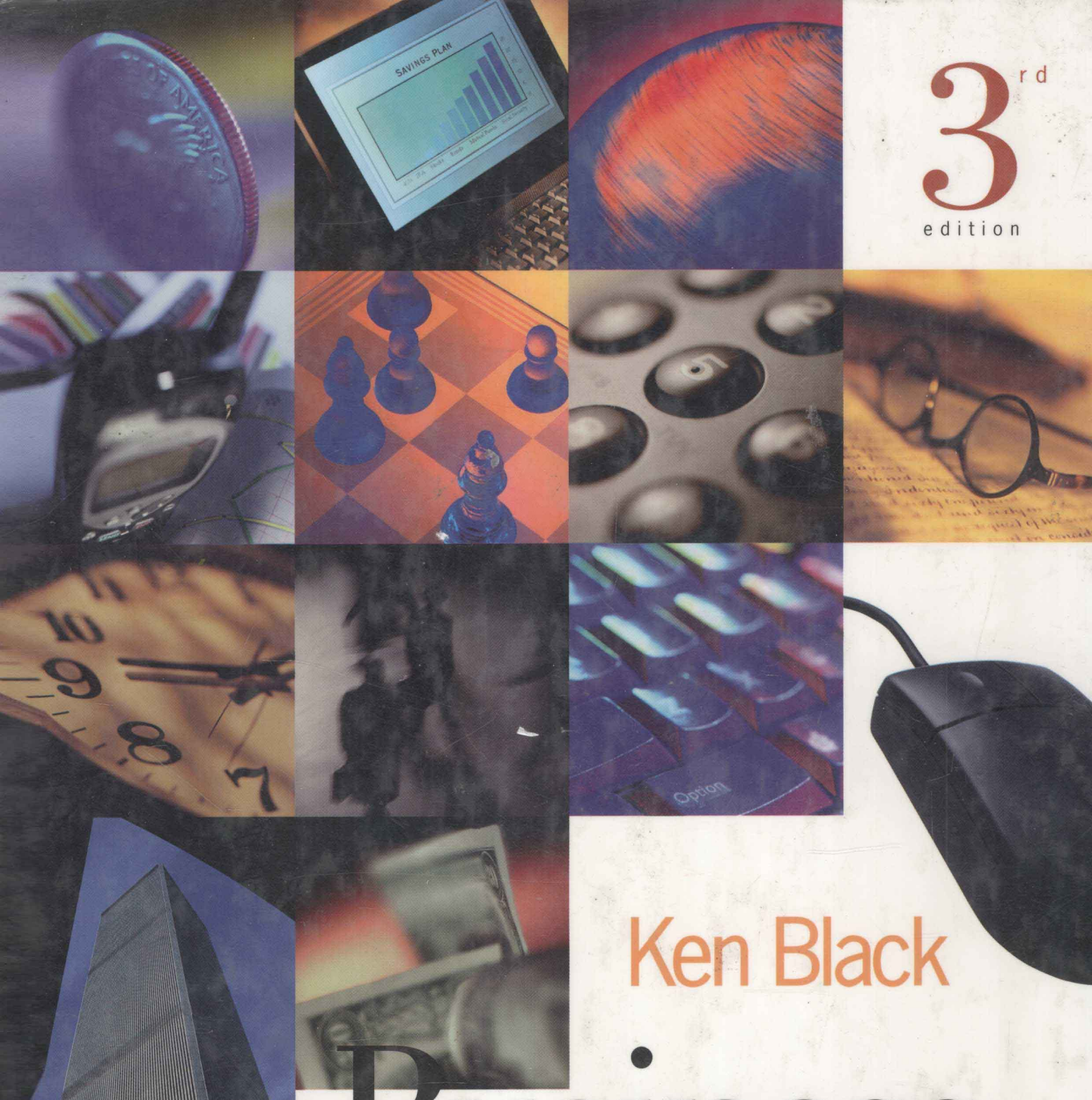

3rd edition

Ken Black

Business Statistics

Contemporary Decision Making

Business Statistics: Contemporary Decision Making

3rd Edition

Ken Black

University of Houston — Clear Lake

South-Western College Publishing
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Business Statistics: Contemporary Decision Making, 3rd edition, by Ken Black

Publisher: Dave Shaut
Senior Acquisitions Editor: Charles McCormick, Jr.
Senior Developmental Editor: Alice C. Denny
Senior Marketing Manager: Joseph A. Sabatino
Production Editor: Sandra Gangelhoff
Manufacturing Coordinator: Sandee Milewski
Internal Design: Sandy Kent, Kent and Co., Cincinnati
Cover Design: Ross Design, Cincinnati
Cover Photos: copyright PhotoDisc, Inc.
Photography Manager: Cary Benbow, assisted by Darren Wright
Production House: Lachina Publishing Services
Compositor: Lachina Publishing Services
Printer: West Group

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Printed in the United States of America
1 2 3 4 5 03 02 01 00

For more information contact South-Western College Publishing, 5101 Madison Road, Cincinnati, Ohio, 45227 or find us on the Internet at http://www.swcollege.com

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Library of Congress Cataloging-in-Publication Data

Black, Ken.
Business statistics : contemporary decision making / Ken Black.—3rd ed.
p. cm.
Includes bibliographical references and index.
ISBN 0-324-00920-8 (package)
ISBN 0-324-00922-4 (text only)
ISBN 0-324-00921-6 (CD-ROM only)
1. Commercial statistics. I. Title.

HF1017 .B572 2000
519.5'024'65—dc21

00-036997

This book is printed on acid-free paper.

Preface

The third edition of *Business Statistics: Contemporary Decision Making* is written and designed for a two-semester introductory undergraduate business statistics course or an MBA-level introductory course. In addition, with 18 chapters, the third edition lends itself nicely to adaptation for a one-semester introductory business statistics course. The text is written with the assumption that the student has a college algebra mathematical background. No calculus is used in the presentation of material in the text.

The text is targeted for the large number of business students who will not be statisticians but rather will become decision makers in the business community. The quantitative decision-making skills and statistical understanding gained from this text will enable students to perform well in the business world and make better decisions. As in the second edition, the concepts of statistics are presented in a setting of business decision making through the use of real business data and applications. To this end, real data and examples from the business environment appear virtually everywhere in the text.

South-Western College Publishing is very proud to publish the third edition of Ken Black's *Business Statistics: Contemporary Decision Making.* We sought and gained the experience of current users and their suggestions for improvement. While there was widespread support for the very complete topical coverage, pedagogy, and context of the second edition; many users—including the author—wanted a shorter text. We responded by creating a new edition that maintains the integrity of approach and subject matter, but is leaner and more efficient. With the exception of a few minor items, we retained virtually all topics yet made significant strides in reducing the size of the text by placing the databases on a CD-ROM included in every text, deleting nonessential features and redundant explanations, and using a more creative layout.

Changes for the Third Edition

Several new features of the third edition set this text apart from others in the field. These include:

Presentation of Microsoft® Excel and MINITAB Software Output

The third edition has a strong focus on *both* Excel and MINITAB software packages. More than 250 Excel 97 or MINITAB Release 12 computer-generated outputs are displayed.

Excel, because it is a part of Microsoft Office, has been installed on millions of computers around the world. Most students have access to Excel at home, school, or work. Because of the one-two punch of the **Data Analysis** tool and the paste function feature, Excel has considerable statistical capability.

MINITAB is also featured because it has done an excellent job of keeping pace with the continual changes and demands of statistics in business. MINITAB Release 12, featured in this text, has techniques for analyzing proportions, greater data and file management capabilities including multiple worksheets, the capability of performing polynomial regression, and clarified and strengthened presentation of quality tools. In addition, the MINITAB spreadsheet is easier than ever to use.

New Topical Coverage

Using Histograms to Get an Initial Overview of the Data has been added to the graphical depiction section of Chapter 2. Because of the widespread use of computers and statistically oriented software packages, many analysts find it useful to get an overview of data by generating a histogram. The histogram can display the general shape of the distribution of data, which can give the analyst a framework within which to interpret and use other statistical techniques.

Another new topic, *six sigma,* is located in Chapter 17. Six sigma is a continuous quality improvement technique being used as a philosophy and a methodology in many businesses today. Any contemporary discussion of continuous quality improvement and statistical process control without six sigma is incomplete.

New Problems

All second-edition problems were examined for timeliness, appropriateness, clarity, and logic. Those that fell short were replaced or rewritten. Many new problems were constructed in an effort to maximize the usefulness of each. All problems with time-based values were updated. The total number of problems in the text was not increased but rather a concerted effort was made to include only problems that make a significant contribution to the learning process.

All demonstration problems and example problems were thoroughly reviewed and edited for effectiveness. Virtually all example and demonstration problems in the third edition are business-oriented and contain the most current data available.

As with the previous edition, problems are located at the end of most sections in the chapters. A significant number of additional problems are provided at the end of each chapter in the Supplementary Problems. The Supplementary Problems are "scrambled"—problems using the various techniques in the chapter are mixed—so that students can test themselves on their ability to discriminate and differentiate ideas and concepts.

New Databases

The third edition contains seven completely reworked databases, including a new stock market database, all of which are available in both Excel and MINITAB format ready for use. A manufacturing database, a financial database, a stock market database, an international employment database, an energy database, a healthcare database, and an agri-business database provide over 8350 observations and 56 variables. All data are real and from reliable sources that users will recognize: the U.S. Bureau of Labor Statistics, the New York Stock Exchange, the U.S. Department of Agriculture, Moody's Handbook of Common Stocks, the American Hospital Association, and the U.S. Bureau of the Census. Four of the seven databases have time-series data; one contains 168 months of time-series data ideal for demonstrating and analyzing forecasting decomposition techniques.

CD-ROM

As mentioned earlier in this preface, data files are included on the CD-ROM packaged with each textbook. All databases on the CD-ROM are in both Excel and MINITAB formats for easy access and use. The CD-ROM also contains Excel and MINITAB files of data from text problems and cases in which there are more than 10 data entries. Instructors and students now have the option of analyzing the larger data sets using the computer. For those who wish to use them, the CD-ROM also contains updated versions of the Decision Dilemma and In Reaction boxes that appeared in the second edition. In addition, the section on Advanced Exponential Smoothing Techniques (from Chapter 15) has been removed from the text, updated, and placed on the CD-ROM. Derivation of the slope and intercept formulas from Chapter 12 are also included on the CD-ROM along with a tutorial on summation theory.

Interpreting the Output

In most chapters, the end-of-chapter Supplementary Problems section contains a new subsection entitled *Interpreting the Output.* This new subsection complements the other two subsections, *Calculating the Statistics* and *Testing Your Understanding,* by providing several problems (usually four) in which the student is given software output and asked to interpret, discuss, or analyze the output. *Interpreting the Output* places more emphasis on understanding and interpreting statistics for decision making.

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New Cases

Six of the eighteen cases in the third edition are entirely new. All other cases have been updated and revised with new information about the company and the business dilemma that is being studied. The six new cases analyze problems and opportunities facing DiGiorno Pizza, Colgate-Palmolive, Fuji Film, Shell Oil, Thermatrix, and Frito-Lay.

Statistics in Business Today

Each chapter of the third edition contains a new boxed feature, Statistics in Business Today, that presents an example of how techniques or concepts from that chapter currently are being used in business. These interesting features reinforce the notion that statistics provides important tools that are being used in business every day in many different ways.

Website

The third edition has a website that contains many valuable features. One such feature, Statistics on the Internet, is included for each text chapter. By providing information about and Internet addresses for many statistical websites, this feature serves as a guide to websites created by educators, businesses, and individuals. These websites contain tutorials on various statistical concepts and techniques, interactive analysis opportunities, glossaries of statistical concepts, additional databases, additional examples of the use of statistics, and many other interesting and informative items. Statistics on the Internet can be very helpful to both instructors and students in finding material that augments both distance learning courses and traditional courses.

Using password protection, instructors may access the Instructor's Manual; the PowerPoint slides are available to both students and instructors. Through this website Ken Black can also provide updated versions of the Decision Dilemma and In Response features from the second edition, as well as additional examples of business applications related to various statistical techniques.

Features and Benefits

The third edition of *Business Statistics: Contemporary Decision Making* is organized in a manner similar to the second edition. However, in an effort to streamline the book and yet retain the integrity of topical coverage and pedagogy, some features—including the Decision Dilemma, In Response, Focus Boxes, and Statistics on the Internet—have been moved from the main text to the CD-ROM or the text website. The Focus Boxes of the second edition have been replaced with a Statistics in Business Today feature within each chapter.

Each chapter of the third edition contains learning objectives, demonstration problems, problems and supplementary problems, a Statistics in Business Today boxed feature, a chapter summary, key terms, formulas, an Ethical Considerations box, an Analyzing the Databases section, a case, and a Using the Computer section.

- **Learning Objectives.** Each chapter begins with a statement of the chapter's main learning objectives. This statement gives the reader a list of key topics that will be discussed and the goals to be achieved from studying the chapter.
- **Demonstration Problems.** Virtually every section of every chapter in the third edition contains demonstration problems. A demonstration problem contains both an example problem and its solution, and is used as an additional pedagogical tool to supplement explanations and examples.
- **Problems.** There are nearly 1000 problems in the text. Most problems utilize real data gathered from a plethora of sources. Problems for practice are found at the end of almost every section of the text. At the end of each chapter is an extensive set of Supplementary Problems. These problems are divided into three groups: Calculating the Statistics, which are strictly computation problems; Testing Your Understanding, which are problems for

application and understanding; and Interpreting the Output, which are problems that require the interpretation and analysis of software output.

- **Statistics in Business Today.** Each Statistics in Business Today feature contains an interesting application of how techniques of that particular chapter are used in the business world today. This feature replaces the Focus Boxes of the second edition
- **Chapter Summary.** Each chapter concludes with a summary of the important concepts, ideas, and techniques of the chapter. This feature can serve as a preview of the chapter as well as a chapter review.
- **Key Terms.** Important terms are printed and defined in the margin of the text near where they are discussed. At the end of the chapter, a list of the key terms defined in the chapter is presented. In addition, these terms appear with their definitions in an end-of-book Glossary.
- **Formulas.** Important formulas in the text are highlighted and boxed to make it easy for a reader to locate them. At the end of the chapter, most of the chapter's formulas are listed together as a handy reference.
- **Ethical Considerations.** The Ethical Considerations feature underscores the potential misuse of business statistics. Topics discussed include lying with statistics, failing to meet statistical assumptions, failing to include pertinent information for decision makers, and other such matters of principle.
- **Analyzing the Databases.** There are seven major databases located on the CD-ROM that accompanies the third edition. The end-of-chapter Analyzing the Databases section contains several questions/problems that require the application of techniques from the chapter to data in the variables of the databases. The assumption is that most of these questions/problems will be solved by using a computer.
- **Case.** Each end-of-chapter case is based on a real company. These cases give the student an opportunity to use statistical concepts and techniques presented in the chapter to solve a business dilemma. Some cases feature very large companies—such as Shell Oil, Coca-Cola, or Colgate-Palmolive. Others pertain to small businesses—such as Thermatrix, Robotron, or Fletcher-Terry—that have overcome obstacles to survive and thrive. Most cases include raw data (also located on the CD-ROM) for analysis and questions that encourage the student to use several of the techniques presented in the chapter. In many cases, the student must analyze software output in order to reach conclusions or make decisions.
- **Using the Computer.** The Using the Computer section contains directions for producing the Excel 97 and MINITAB Release 12 software output presented in the chapter. It is assumed that students have a general understanding of a Microsoft® Windows environment. Directions include specifics about menu bars, drop-down menus, and dialog boxes. Not every detail of every dialog box is discussed; the intent is to provide enough information for students to produce the same statistical output analyzed and discussed in the chapter.

Ancillary Teaching and Learning Materials

Two ancillaries are available to students either through their bookstore or for direct purchase through the online catalog at http://www.swcollege.com.

- Prepared by textbook author Ken Black, the ***Solutions Manual and Study Guide*** (ISBN: 0-324-00923-2) provides students with review materials, study questions with answers, and solutions to the odd-numbered problems for each textbook chapter.
- ***An Excel Companion for Business Statistics*** (ISBN: 0-538-89088-6), by David Eldredge of Murray State College, provides step-by-step instructions for using Microsoft® Excel 97 to solve many of the problems included in an introductory business statistics course.

South-Western's business statistics textbooks are available with **MINITAB Student Software Version 12** as a bundle option for only a small increase in price. MINITAB Student Software Version 12, which includes all the methods needed for introductory business statistics courses, is a streamlined and economical version of MINITAB Professional. Contact your local South-Western representative for more details.

The following instructor support materials are available to adopters from the Thomson Learning Academic Resource Center at 800-423-0563 or through **www.swcollege.com**.

- **Instructor's Resource Kit** on CD-ROM (ISBN: 0-324-00924-0)—All instructor ancillaries are now provided on a CD-ROM. Included in this convenient format are:

  Instructor's Manual—The *Instructor's Manual,* prepared by Ken Black, contains chapter outlines, teaching strategies, and full solutions to all problems and cases presented in the text.

  PowerPoint™ Presentation Slides—The presentation slides contain graphics to help instructors create stimulating lectures. The PowerPoint 97 slides may be adapted using PowerPoint software to facilitate classroom use.

  Test Bank—Prepared by Aaron Brown of Texas A & M University–Corpus Christi, the Test Bank includes multiple choice questions for each chapter. The Test Bank is provided in Microsoft® Word format on the CD-ROM.

  ExamView—This computerized testing software comes on a CD-ROM also, and allows instructors to create, edit, store, and print exams.

Acknowledgments

South-Western and I thank the reviewers and advisors who cared enough and took the time to provide us with their excellent insights and advice, which was used to reshape and mold the text into the third edition. These colleagues include:

Randy Anderson, University of California–Fresno
Aaron Brown, Texas A & M University–Corpus Christi
Louise J. Clark, Jacksonville State University (AL)
Stuart M. Glosser, University of Wisconsin–Whitewater
David D. Krueger, St. Cloud State University
Leigh Lawton, University of St. Thomas (MN)
WanSoo T. Rhee, Ohio State University
Richard Scott, University of Arizona–Tucson
Daniel G. Shimshak, University of Massachusetts–Boston
Gary Yoshimoto, St. Cloud State University

Special thanks to Aaron Brown, Texas A & M University–Corpus Christi, who again prepared the Test Bank for the third edition. As always, I wish to recognize my colleagues at the University of Houston–Clear Lake for their continued interest and support of this project. In particular, I want to thank William Staples, President; Jim Hayes, Provost; and Ted Cummings, Dean of the School of Business, for their personal interest in the book and their administrative support. Mike Hanna and Vance Etnyre, decision sciences faculty members at UHCL, have spent many hours dialoging with me about the text and giving me important ideas from which to write and edit. Many thanks to them.

There are many people within the South-Western College Publishing group that I would like to thank for their invaluable assistance on this project. In particular, I would like to cite: Charles McCormick, Jr., senior acquisitions editor, who shepherded this revision from its inception and provided a positive working climate; Joe Sabatino, senior marketing manager, who helped position the book in the marketplace and provided market insights; Alice Denny, senior development editor, who directed the reviewing and revision processes and has kept the text and ancillaries on schedule; and Sandra Gangelhoff, production editor, who provided her usual professional assistance in producing the finished text.

I want to express a special appreciation to my wife of 31 years, Carolyn, who continues to provide both professional and personal support in my writing. Thanks also to my daughters, Wendi and Caycee, who constantly live with "the book" and have shown extreme patience with me as I work to meet writing deadlines.

—Ken Black

About the Author

Ken Black is currently Professor of Decision Sciences in the School of Business and Public Administration at the University of Houston—Clear Lake. Born in Cambridge, Massachusetts and raised in Missouri, he earned a Bachelor's degree in mathematics from Graceland College, a Master's degree in math education from the University of Texas at El Paso, a Ph.D. in business administration in management science, and a Ph.D. in educational research from the University of North Texas.

Since joining the faculty in 1979, Professor Black has taught all levels of statistics courses, forecasting, management science, market research, and production/operations management. He has published fifteen journal articles and over twenty professional papers as well as two textbooks, *Business Statistics: An Introductory Course* and *Business Statistics: Contemporary Decision Making.* Black has consulted for many different companies including Aetna, City of Houston, NYLCare, AT&T, Johnson Space Center, Southwest Information Resources, Connect Corporation, and Eagle Engineering.

Ken Black and his wife Carolyn have two daughters, Caycee and Wendi. His hobbies include playing the guitar, reading, coaching girls' softball, and participating in Master's track and field as a long jumper and a triple jumper.

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