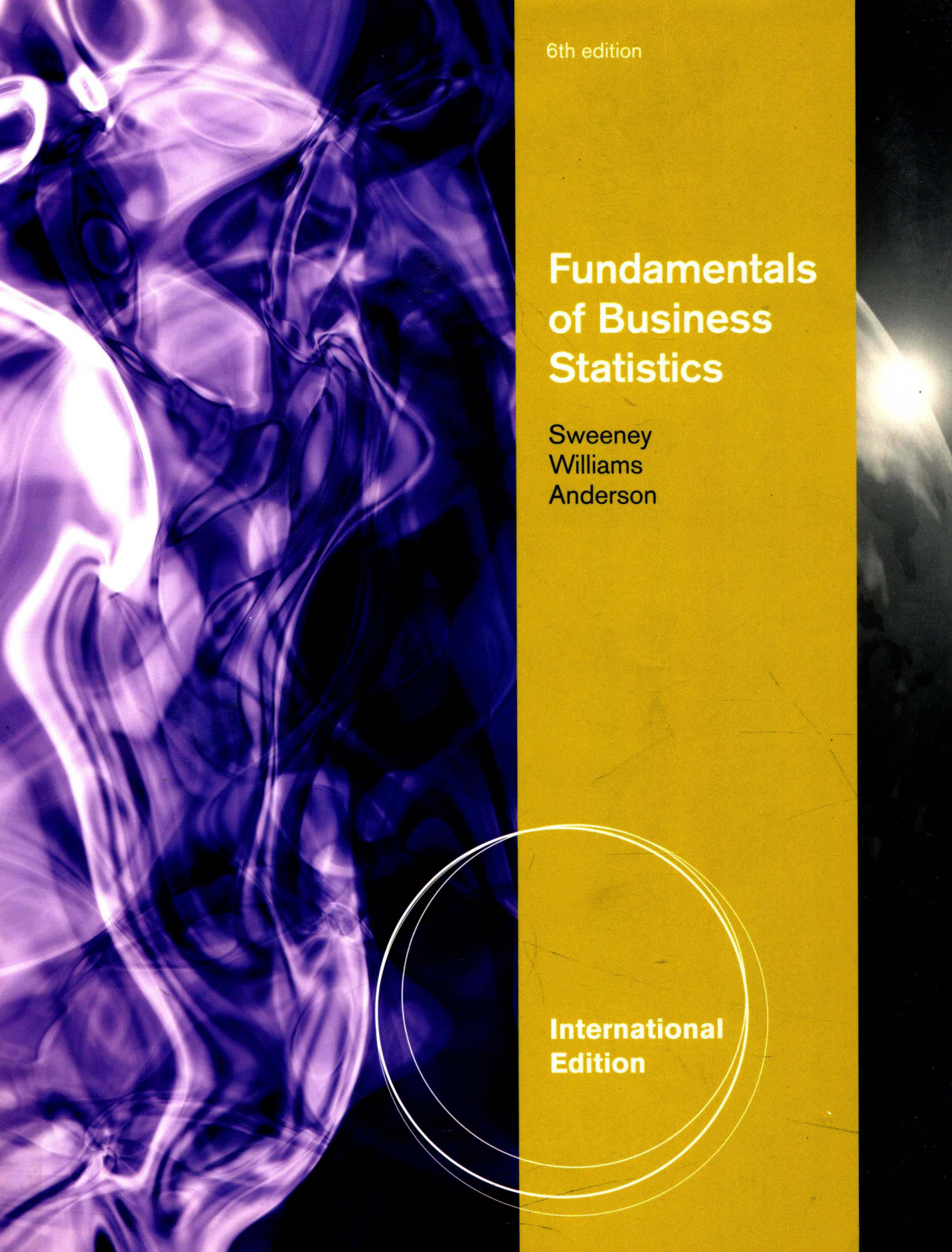
6th edition
Fundamentals of Business Statistics
Sweeney
Williams
Anderson
International Edition

FUNDAMENTALS OF BUSINESS STATISTICS, 6E

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Preface

The purpose of *FUNDAMENTALS OF BUSINESS STATISTICS* is to give students, primarily those in the fields of business administration and economics, a conceptual introduction to the field of statistics and its many applications. The text is applications oriented and written with the needs of the nonmathematician in mind; the mathematical prerequisite is knowledge of algebra.

Applications of data analysis and statistical methodology are an integral part of the organization and presentation of the text material. The discussion and development of each technique is presented in an application setting, with the statistical results providing insights to decisions and solutions to problems.

Although the book is applications oriented, we have taken care to provide sound methodological development and to use notation that is generally accepted for the topic being covered. Hence, students will find that this text provides good preparation for the study of more advanced statistical material. A bibliography to guide further study is included as an appendix.

The text introduces the student to the software packages of Minitab 15 and Microsoft® Office Excel® 2007 and emphasizes the role of computer software in the application of statistical analysis. Minitab is illustrated as it is one of the leading statistical software packages for both education and statistical practice. Excel is not a statistical software package, but the wide availability and use of Excel make it important for students to understand the statistical capabilities of this package. With this edition, we are making available a commercial Excel add-in, StatTools, that extends the range of statistical options for Excel users. Minitab, Excel, and StatTools procedures are provided in chapter appendixes so that instructors have the flexibility of using as much computer emphasis as desired for the course.

It is likely there will be users of both Excel 2007 and Excel 2010 using this text. To accommodate both groups of users, the step-by-step procedures and the worksheets presented in our Excel appendixes were developed and tested using both Excel 2007 and the public beta versions of Excel 2010. For Excel 2007 users we have included on the website that accompanies the text a primer entitled Microsoft Excel 2007 and Tools for Statistical Analysis. A similar primer entitled Microsoft Excel 2010 and Tools for Statistical Analysis is provided on the website for Excel 2010 users.

Changes in the Sixth Edition

We appreciate the acceptance and positive response to the previous editions of *FUNDAMENTALS OF BUSINESS STATISTICS*. Accordingly, in making modifications for this new edition, we have maintained the presentation style and readability of those editions. The significant changes in the new edition are summarized here.

Content Revisions

- **StatTools Add-In for Excel.** Excel 2007 does not contain statistical functions or data analysis tools to perform all the statistical procedures discussed in the text. StatTools is a commercial Excel 2007 add-in, developed by Palisade Corporation, that provides additional statistical options for Excel users. In an appendix to Chapter 1 we show how to download and install StatTools, and most chapters include a chapter appendix that shows the steps required to implement a statistical procedure using StatTools.

  We have been very careful to make the use of StatTools completely optional so that instructors who want to teach using the standard tools available in Excel 2007 can continue to do so. But users who want additional statistical capabilities not available in standard Excel 2007 now have access to an industry standard statistics add-in that students will be able to continue to use in the workplace.
- **Change in Terminology for Data.** In the previous edition, nominal and ordinal data were classified as qualitative; interval and ratio data were classified as quantitative. In this edition, nominal and ordinal data are referred to as categorical data. Nominal and ordinal data use labels or names to identify categories of like items. Thus, we believe that the term *categorical* is more descriptive of this type of data.
- **Introducing Data Mining.** A new section in Chapter 1 introduces the relatively new field of data mining. We provide a brief overview of data mining and the concept of a data warehouse. We also describe how the fields of statistics and computer science join to make data mining operational and valuable.
- **Ethical Issues in Statistics.** Another new section in Chapter 1 provides a discussion of ethical issues when presenting and interpreting statistical information.
- **Updated Excel Appendix for Tabular and Graphical Descriptive Statistics.** The chapter-ending Excel appendix for Chapter 2 shows how the Chart Tools, PivotTable Report, and PivotChart Report can be used to enhance the capabilities for displaying tabular and graphical descriptive statistics.
- **Comparative Analysis with Box Plots.** The treatment of box plots in Chapter 2 has been expanded to include relatively quick and easy comparisons of two or more data sets. Typical starting salary data for accounting, finance, management, and marketing majors are used to illustrate box plot multigroup comparisons.
- **Revised Sampling Material.** The introduction of Chapter 7 has been revised and now includes the concepts of a sampled population and a frame. The distinction between sampling from a finite population and an infinite population has been clarified, with sampling from a process used to illustrate the selection of a random sample from an infinite population. A practical advice section stresses the importance of obtaining close correspondence between the sampled population and the target population.

- **Revised Introduction to Hypothesis Testing.** Section 9.1, Developing Null and Alternative Hypotheses, has been revised. A better set of guidelines has been developed for identifying the null and alternative hypotheses. The context of the situation and the purpose for taking the sample are key. In situations in which the focus is on finding evidence to support a research finding, the research hypothesis is the alternative hypothesis. In situations where the focus is on challenging an assumption, the assumption is the null hypothesis.
- **New Case Problems.** We have added 5 new case problems to this edition, bringing the total number of case problems to 31. A new case problem on descriptive statistics appears in Chapter 3 and a new case problem on hypothesis testing appears in Chapter 9. Two new case problems have been added to regression in Chapters 12 and 13. These case problems provide students with the opportunity to analyze larger data sets and prepare managerial reports based on the results of the analysis.
- **New Statistics in Practice Application.** Each chapter begins with a Statistics in Practice vignette that describes an application of the statistical methodology to be covered in the chapter. New to this edition is the Statistics in Practice article for Oceanwide Seafood in Chapter 4.
- **New Examples and Exercises Based on Real Data.** We continue to make a significant effort to update our text examples and exercises with the most current real data and referenced sources of statistical information. In this edition, we have added approximately 140 new examples and exercises based on real data and referenced sources. Using data from sources also used by *The Wall Street Journal*, *USA Today*, *Barron's*, and others, we have drawn from actual studies to develop explanations and to create exercises that demonstrate the many uses of statistics in business and economics. We believe that the use of real data helps generate more student interest in the material and enables the student to learn about both the statistical methodology and its application. The sixth edition of the text contains over 300 examples and exercises based on real data.

Features and Pedagogy

Authors Sweeney, Williams, and Anderson have continued many of the features that appeared in previous editions. Important ones for students are noted here.

Methods Exercises and Applications Exercises

The end-of-section exercises are split into two parts, Methods and Applications. The Methods exercises require students to use the formulas and make the necessary computations. The Applications exercises require students to use the chapter material in real-world situations. Thus, students first focus on the computational "nuts and bolts" and then move on to the subtleties of statistical application and interpretation.

Self-Test Exercises

Certain exercises are identified as "Self-Test Exercises." Completely worked-out solutions for these exercises are provided in Appendix D at the back of the book. Students can attempt the Self-Test Exercises and immediately check the solution to evaluate their understanding of the concepts presented in the chapter.

Margin Annotations and Notes and Comments

Margin annotations that highlight key points and provide additional insights for the student are a key feature of this text. These annotations are designed to emphasize and enhance understanding of the terms and concepts being presented in the text.

At the end of many sections, we provide Notes and Comments designed to give the student additional insights about the statistical methodology and its application. Notes and Comments include warnings about or limitations of the methodology, recommendations for application, brief descriptions of additional technical considerations, and other matters.

Data Files Accompany the Text

Approximately 250 data files are available on the website that accompanies the text. The data sets are available in both Minitab and Excel formats. File logos are used in the text to identify the data sets that are available on the website. Data sets for all case problems as well as data sets for larger exercises are included.

Innovative Technology

Aplia

Aplia's **online learning solution** makes business statistics relevant and engaging to students with interactive, automatically graded assignments. As students answer each question, they receive instant, detailed feedback—and their grades are automatically recorded in your Aplia gradebook.

Problem Sets

Students stay engaged in their coursework by regularly completing interactive problem sets. Aplia offers original, auto-graded problems—each question providing instant, detailed feedback.

Tutorials

Students prepare themselves to learn course concepts by using interactive tutorials that help them overcome deficiencies in necessary prerequisites. By assigning these tutorials, you no longer need to spend valuable class time reviewing these subjects.

Assessment & Grading

Aplia keeps you informed about student participation, progress, and performance through real-time graphical reports. You can easily download, save, manipulate, print, and import student grades into your current grading program.

Course Management System

You can post announcements, upload course materials, e-mail students, and manage your gradebook in Aplia's easy-to-use course management system. Aplia works independently or in conjunction with other course management systems.

CengageNOW

CengageNOW™ is an **online teaching and learning resource** that gives you **more control in less time** and **delivers better outcomes**—NOW! CengageNOW combines the best of current technology tools—including homework support, assessment and tutorial support, testing, and an eBook—to further your course goals and save you significant preparation and grading time!

CengageNOW is an Online Teaching and Learning Resource

CengageNOW offers all of your teaching and learning resources in one intuitive program organized around the essential activities you perform for class—lecturing, creating assignments, grading, quizzing, and tracking student progress and performance. CengageNOW provides students access to interactive tutorials, videos, animations, games, and other multimedia tools that help them get the most out of your course.

CengageNOW Provides More Control in Less Time

CengageNOW's flexible assignment and gradebook options provide you more control while saving you valuable time in planning and managing your course assignments. With CengageNOW, you can automatically grade all assignments, weigh grades, choose points or percentages, and set the number of attempts and due dates per problem to best suit your overall course plan.

CengageNOW Delivers Better Student Outcomes

The CengageNOW personalized study plans consist of a chapter-specific Pre-Test, Study Plan, and Post-Test that utilize valuable text-specific assets to empower students to master concepts, prepare for exams, and be more involved in class. Results to the personalized study plan materials provide immediate and ongoing feedback — *to both you and your students*. Best of all, the CengageNOW personalized study plan is designed to help your students get a better grade in your class.

For more information, visit www.cengage.com/now.

Supplements for Students

Student Access Card (Premium Online Content)

A useful access code, *provided at no extra cost with each new text*, provides access to data files to help students master key statistical software for success in today's classroom and tomorrow's business world. Students will have access to all of the templates and data sets for Excel® and Minitab® necessary to complete text exercises on the computer. Also posted are the "Microsoft Excel 2007 and Tools for Statistical Analysis" and "Microsoft Excel 2010 and Tools for Statistical Analysis" primers, and a link to download a textbook version of StatTools.

Supplements for Instructors

Test Bank

Efficiently assess your students' knowledge with a comprehensive selection of multiple-choice questions and problems for each chapter. *Available on the website*, www.cengage.com/international.

ExamView® Computerized Test Bank

This easy-to-use, test-creation program contains all of the questions from the Test Bank, making it easy for you to customize tests to your specific class needs, edit or create questions, and store customized exams. This is an ideal tool for online testing. *Available on the website*, www.cengage.com/international.

Solutions Manual

This manual, prepared by the text authors to ensure accuracy, provides the solutions for all problems in the text, For your convenience, this edition now shows the solution steps using the cummulative normal distrubution and offers more details in the explanations about how to compute the p-values. *Available on the website*, www.cengage.com/international.

Solutions for Case Problems

Prepared by the text authors to ensure accuracy, these solutions to the case problems from the text help you easily plan, assign, and efficiently grade case-problem assignments that are critical for student practice. *Available on the website*, www.cengage.com/international.

PowerPoint® Presentation Slides

Bring your lectures to life, clarify difficult concepts, and provide guides for student note-taking and study with these animated presentation slides. Step-by-step graphics that correspond with the text help ensure student attention and understading. *Available on the website*, www.cengage.com/international.

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Professor Sweeney has published more than thirty articles and monographs in the area of management science and statistics. The National Science Foundation, IBM, Procter & Gamble, Federated Department Stores, Kroger, and Cincinnati Gas & Electric have funded his research, which has been published in *Management Science*, *Operations Research*, *Mathematical Programming*, *Decision Sciences*, and other journals.

Professor Sweeney has coauthored ten textbooks in the areas of statistics, management science, linear programming, and production and operations management.

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Before joining the College of Business at RIT, Professor Williams served for seven years as a faculty member in the College of Business Administration at the University of Cincinnati, where he developed the undergraduate program in Information Systems and then served as its coordinator. At RIT he was the first chairman of the Decision Sciences Department. He teaches courses in management science and statistics, as well as graduate courses in regression and decision analysis.

Professor Williams is the coauthor of eleven textbooks in the areas of management science, statistics, production and operations management, and mathematics. He has been a consultant for numerous *Fortune* 500 companies and has worked on projects ranging from the use of data analysis to the development of large-scale regression models.

David R. Anderson. David R. Anderson is Professor of Quantitative Analysis in the College of Business Administration at the University of Cincinnati. Born in Grand Forks, North Dakota, he earned his B.S., M.S., and Ph.D. degrees from Purdue University. Professor Anderson has served as Head of the Department of Quantitative Analysis and Operations Management and as Associate Dean of the College of Business Administration. In addition, he was the coordinator of the College's first Executive Program.

At the University of Cincinnati, Professor Anderson has taught introductory statistics for business students as well as graduate-level courses in regression analysis, multivariate analysis, and management science. He has also taught statistical courses at the Department of Labor in Washington, D.C. He has been honored with nominations and awards for excellence in teaching and excellence in service to student organizations.

Professor Anderson has coauthored ten textbooks in the areas of statistics, management science, linear programming, and production and operations management. He is an active consultant in the field of sampling and statistical methods.

Brief Contents

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