FROM THE

In *Essentials of Business Statistics, Fifth Edition,* we provide a modern, practical, and unique framework for teaching an introductory course in business statistics. As in previous editions, we employ real or realistic examples, continuing case studies, and a business improvement theme to teach the material. Moreover, we believe that this fifth edition features more concise and lucid explanations, an improved topic flow, and a judicious use of realistic and compelling examples. Overall, the fifth edition is 32 pages shorter than the fourth edition while covering all previous material as well as additional topics. Below we outline the attributes and new features we think make this book an effective learning tool.

- **Continuing case studies that tie together different statistical topics.** These continuing case studies span not only individual chapters but also groups of chapters. Students tell us that when new statistical topics are developed in the context of familiar cases, their "fear factor" is reduced. Of course, to keep the examples from becoming overtired, we introduce new case studies throughout the book.
- **Business improvement conclusions that explicitly show how statistical results lead to practical business decisions.** After appropriate analysis and interpretation, examples and case studies often result in a business improvement conclusion. To emphasize this theme of business improvement, icons BI are placed in the page margins to identify when statistical analysis has led to an important business conclusion. The text of each conclusion is also highlighted in yellow for additional clarity.
- **Examples exploited to motivate an intuitive approach to statistical ideas.** Most concepts and formulas, particularly those that introductory students find most challenging, are first approached by working through the ideas in accessible examples. Only after simple and clear analysis within these concrete examples are more general concepts and formulas discussed.
- **An improved introduction to business statistics in Chapter 1.** The example introducing data and how data can be used to make a successful offer to purchase a house has been made clearer, and two new and more graphically oriented examples have been added to better introduce quantitative and qualitative variables. Random sampling is introduced informally in the context of more tightly focused case studies. [The technical discussion about how to select random samples and other types of samples is in Chapter 7 (Sampling and Sampling Distributions), but the reader has the option of reading about sampling in Chapter 7 immediately after Chapter 1.] Chapter 1 also includes a new discussion of ethical guidelines for practitioners of statistics. Throughout the book, statistics is presented as a broad discipline requiring not simply analytical skills but also judgment and personal ethics.
- **A more streamlined discussion of the graphical and numerical methods of descriptive statistics.** Chapters 2 and 3 utilize several new examples, including an example leading off Chapter 2 that deals with college students' pizza brand preferences. In addition, the explanations of some of the more complicated topics have been simplified. For example, the discussion of percentiles, quartiles, and box plots has been shortened and clarified.
- **An improved, well-motivated discussion of probability and probability distributions in Chapters 4, 5, and 6.** In Chapter 4, methods for calculating probabilities are more clearly motivated in the context of two new examples. We use the Crystal Cable Case, which deals with studying cable television and Internet penetration rates, to illustrate many probabilistic concepts and calculations. Moreover, students' understanding of the important concepts of conditional probability and statistical independence is sharpened by a new real-world case involving gender discrimination at a pharmaceutical company. The probability distribution, mean, and standard deviation of a discrete random variable are all motivated and explained in a more succinct discussion in Chapter 5. An example illustrates how knowledge of a mean and standard deviation are enough to estimate potential investment returns. Chapter 5 also features an improved introduction to the binomial distribution where the previous careful discussion is supplemented by an illustrative tree diagram. Students can now see the origins of all the factors in the binomial formula more clearly. Chapter 5 ends with a new optional section where joint probabilities and covariances are explained in the context of portfolio diversification. In Chapter 6, continuous probabilities are developed by improved examples. The coffee temperature case introduces the key ideas and is eventually used to help study the normal distribution. Similarly, the elevator waiting time case is used to explore the continuous uniform distribution.

AUTHORS

- **An improved discussion of sampling distributions and statistical inference in Chapters 7 through 12.** In Chapter 7, the discussion of sampling distributions has been modified to more seamlessly move from a small population example involving sampling car mileages to a related large population example. The introduction to confidence intervals in Chapter 8 features a very visual, graphical approach that we think makes finding and interpreting confidence intervals much easier. This chapter now also includes a shorter and clearer discussion of the difference between a confidence interval and a tolerance interval and concludes with a new section about estimating parameters of finite populations. Hypothesis testing procedures (using both the critical value and p-value approaches) are summarized efficiently and visually in summary boxes that are much more transparent than traditional summaries lacking visual prompts. These summary boxes are featured throughout the chapter covering inferences for one mean, one proportion, and one variance (Chapter 9), and the chapter covering inferences for two means, two proportions, and two variances (Chapter 10), as well as in later chapters covering regression analysis. In addition, the discussion of formulating the null and alternative hypotheses has been completely rewritten and expanded, and a new, earlier discussion of the weight of evidence interpretation of p-values is given. Also, a short presentation of the logic behind finding the probability of a Type II error when testing a two-sided alternative hypothesis now accompanies the general formula that can be used to calculate this probability. In Chapter 10 we mention the unrealistic "known variance" case when comparing population means only briefly and move swiftly to the more realistic "unknown variance" case. The discussion of comparing population variances has been shortened and made clearer. In Chapter 11 (Experimental Design and Analysis of Variance) we use a concise but understandable approach to covering one-way ANOVA, the randomized block design, and two-way ANOVA. A new, short presentation of using hypothesis testing to make pairwise comparisons now supplements our usual confidence interval discussion. Chapter 12 covers chi-square goodness-of-fit tests and tests of independence.
- **Streamlined and improved discussions of simple and multiple regression and statistical quality control.** As in the fourth edition, we use the Tasty Sub Shop Case to introduce the ideas of both simple and multiple regression analysis. This case has been popular with our readers. In Chapter 13 (Simple Linear Regression Analysis), the discussion of the simple linear regression model has been slightly shortened, the section on residual analysis has been significantly shortened and improved, and more exercises on residual analysis have been added. After discussing the basics of multiple regression, Chapter 14 has five innovative, advanced sections that are concise and can be covered in any order. These optional sections explain (1) using dummy variables (including an improved discussion of interaction when using dummy variables), (2) using squared and interaction terms, (3) model building and the effects of multicollinearity (including an added discussion of backward elimination), (4) residual analysis in multiple regression (including an improved and slightly expanded discussion of outlying and influential observations), and (5) logistic regression (a new section). Chapter 15, which is on the book's website and deals with process improvement, has been streamlined by relying on a single case, the hole location case, to explain $\overline{X}$ and R charts as well as establishing process control, pattern analysis, and capability studies.
- **Increased emphasis on Excel and MINITAB throughout the text.** The main text features Excel and MINITAB outputs. The end-of-chapter appendices provide improved step-by-step instructions about how to perform statistical analyses using these software packages as well as MegaStat, an Excel add-in.

Bruce L. Bowerman
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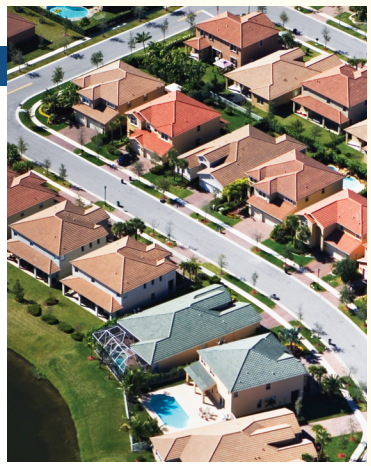
Chapter Introductions

Each chapter begins with a list of the section topics that are covered in the chapter, along with chapter learning objectives and a preview of the case study analysis to be carried out in the chapter.

CHAPTER 1

An Introduction to Business Statistics



Learning Objectives

When you have mastered the material in this chapter, you will be able to:

- LO1-1 Define a variable.
- LO1-2 Describe the difference between a quantitative variable and a qualitative variable.
- LO1-3 Describe the difference between cross-sectional data and time series data.
- LO1-4 Construct and interpret a time series (runs) plot.
- LO1-5 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.
- LO1-6 Describe the difference between a population and a sample.
- LO1-7 Distinguish between descriptive statistics and statistical inference.
- LO1-8 Explain the importance of random sampling.
- LO1-9 Identify the ratio, interval, ordinal, and nominative scales of measurement (Optional).

Chapter Outline

1.1 Data
1.2 Data Sources
1.3 Populations and Samples
1.4 Three Case Studies That Illustrate Sampling and Statistical Inference
1.5 Ratio, Interval, Ordinal, and Nominative Scales of Measurement (Optional)

The subject of **statistics** involves the study of how to collect, analyze, and interpret data. **Data are facts and figures from which conclusions can be drawn.** Such conclusions are important to the decision making of many professions and organizations. For example, **economists** use conclusions drawn from the latest data on unemployment and inflation to help the government make policy decisions. **Financial planners** use recent trends in stock market prices and economic conditions to make investment decisions. **Accountants** use **sample data** concerning a company's *actual sales revenues* to assess whether the company's *claimed sales revenues* are valid. **Marketing professionals** help businesses decide which products to develop and market by using data that reveal consumer preferences. **Production supervisors** use manufacturing data to evaluate, control, and improve product quality. **Politicians** rely on data from public opinion polls to formulate legislation and to devise campaign strategies. **Physicians and hospitals** use data on the effectiveness of drugs and surgical procedures to provide patients with the best possible treatment.

In this chapter we begin to see how we collect and analyze data. As we proceed through the chapter, we introduce several case studies. These case studies (and others to be introduced later) are revisited throughout later chapters as we learn the statistical methods needed to analyze them. Briefly, we will begin to study three cases:

C

The Cell Phone Case. A bank estimates its cellular phone costs and decides whether to outsource management of its wireless resources by studying the calling patterns of its employees.

The Marketing Research Case. A bottling company investigates consumer reaction to a new bottle design for one of its popular soft drinks.

The Car Mileage Case. To determine if it qualifies for a federal tax credit based on fuel economy, an automaker studies the gas mileage of its new midsize model.

1.1 Data

LO1-1 Define a variable.

Data sets, elements, and variables We have said that data are facts and figures from which conclusions can be drawn. Together, the data that are collected for a particular study are referred to as a **data set.** For example, Table 1.1 is a data set that gives information about the new homes sold in a Florida luxury home development over a recent three-month period. Potential buyers in this housing community could choose either the "Diamond" or the "Ruby" home model design and could have the home built on either a lake lot or a treed lot (with no water access).

In order to understand the data in Table 1.1, note that any data set provides information about some group of individual **elements,** which may be people, objects, events, or other entities. The information that a data set provides about its elements usually describes one or more characteristics of these elements.

Any characteristic of an element is called a **variable.**

For the data set in Table 1.1, each sold home is an element, and four variables are used to describe the homes. These variables are (1) the home model design, (2) the type of lot on which the home was built, (3) the list (asking) price, and (4) the (actual) selling price. Moreover, each home model design came with "everything included"—specifically, a complete, luxury interior package and a choice (at no price difference) of one of three different architectural exteriors. The builder made the list price of each home solely dependent on the model design. however, the builder gave various price reductions for homes build on treed lots.

TABLE 1.1 A Data Set Describing Five Home Sales HomeSales

Home	Model Design	Lot Type	List Price	Selling Price
1	Diamond	Lake	$494,000	$494,000
2	Ruby	Treed	$447,000	$398,000
3	Diamond	Treed	$494,000	$440,000
4	Diamond	Treed	$494,000	$469,000
5	Ruby	Lake	$447,000	$447,000

Continuing Case Studies and Business Improvement Conclusions

The main chapter discussions feature real or realistic examples, continuing case studies, and a business improvement theme. The continuing case studies span not only individual chapters but also groups of chapters and tie together different statistical topics. To emphasize the text's theme of business improvement, icons BI are placed in the page margins to identify when statistical analysis has led to an important business improvement conclusion. Each conclusion is also highlighted in yellow for additional clarity. For example, in Chapters 1 and 3 we consider **The Cell Phone Case:**

TABLE 1.4 A Sample of Cellular Usages (in Minutes) for 100 Randomly Selected Employees CellUse

75	485	37	547	753	93	897	694	797	477
654	578	504	670	490	225	509	247	597	173
496	553	0	198	507	157	672	296	774	479
0	822	705	814	20	513	546	801	721	273
879	433	420	521	648	41	528	359	367	948
511	704	535	585	341	530	216	512	491	0
542	562	49	505	461	496	241	624	885	259
571	338	503	529	737	444	372	555	290	830
719	120	468	730	853	18	479	144	24	513
482	683	212	418	399	376	323	173	669	611

EXAMPLE 3.5 The Cell Phone Case: Reducing Cellular Phone Costs C

Suppose that a cellular management service tells the bank that if its cellular cost per minute for the random sample of 100 bank employees is over 18 cents per minute, the bank will benefit from automated cellular management of its calling plans. Last month's cellular usages for the 100 randomly selected employees are given in Table 1.4 (page 9), and a dot plot of these usages is given in the page margin. If we add the usages together, we find that the 100 employees used a total of 46,625 minutes. Furthermore, the total cellular cost incurred by the 100 employees is found to be $9,317 (this total includes base costs, overage costs, long distance, and roaming). This works out to an average of $9,317/46,625 = $.1998, or 19.98 cents per minute. Because this average cellular cost per minute exceeds 18 cents per minute, the bank will hire the cellular management service to manage its calling plans.

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TEXT'S FEATURES

Figures and Tables

Throughout the text, charts, graphs, tables, and Excel and MINITAB outputs are used to illustrate statistical concepts. For example:

- In Chapter 3 (**Descriptive Statistics: Numerical Methods**), the following figures are used to help explain the **Empirical Rule**. Moreover, in **The Car Mileage Case** an automaker uses the Empirical Rule to find estimates of the "typical," "lowest," and "highest" mileage that a new midsize car should be expected to get in combined city and highway driving. In actual practice, real automakers have provided similar information broken down into separate estimates for city and highway driving—see the Buick LaCrosse new car sticker in Figure 3.14.

FIGURE 3.14 The Empirical Rule and Tolerance Intervals for a Normally Distributed Population

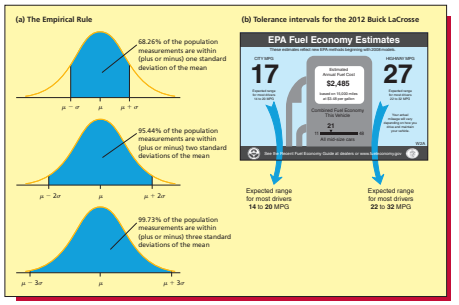
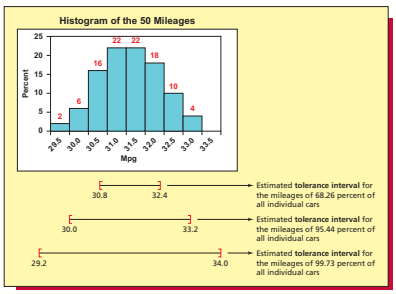


FIGURE 3.15 Estimated Tolerance Intervals in the Car Mileage Case



- In Chapter 7 (**Sampling and Sampling Distributions**), the following figures (and others) are used to help explain the **sampling distribution of the sample mean** and the **Central Limit Theorem**. In addition, the figures describe different applications of random sampling in **The Car Mileage Case**, and thus this case is used as an integrative tool to help students understand sampling distributions.

FIGURE 7.1 A Comparison of Individual Car Mileages and Sample Means

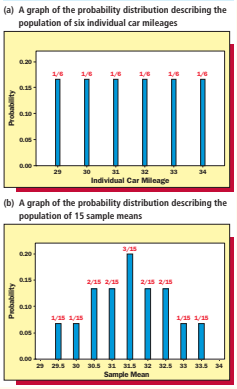


FIGURE 7.2 The Normally Distributed Population of All Individual Car Mileages and the Normally Distributed Population of All Possible Sample Means

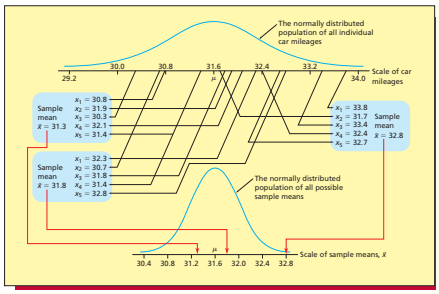


FIGURE 7.3 A Comparison of (1) the Population of All Individual Car Mileages, (2) the Sampling Distribution of the Sample Mean $\bar{x}$ When $n = 5$, and (3) the Sampling Distribution of the Sample Mean $\bar{x}$ When $n = 50$

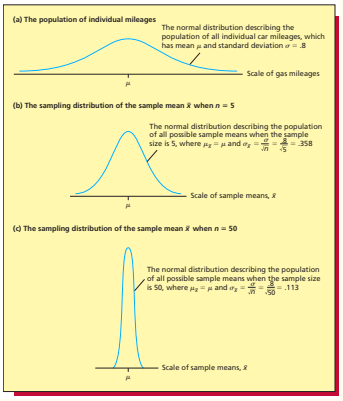
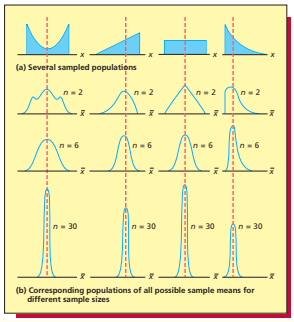


FIGURE 7.5 The Central Limit Theorem Says That the Larger the Sample Size Is, the More Nearly Normally Distributed Is the Population of All Possible Sample Means



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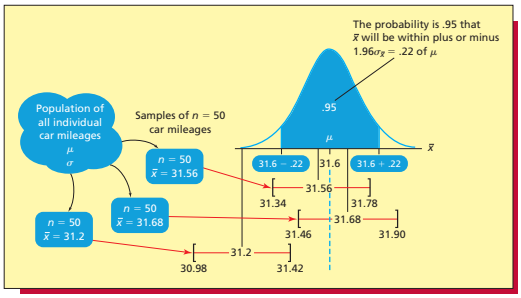
- In Chapter 8 (**Confidence Intervals**), the following figure (and others) are used to help explain the meaning of a **95 percent confidence interval** for the population mean. Furthermore, in **The Car Mileage Case** an automaker uses a confidence interval procedure specified by the Environmental Protection Agency (EPA) to find the EPA estimate of a new midsize model's true mean mileage.

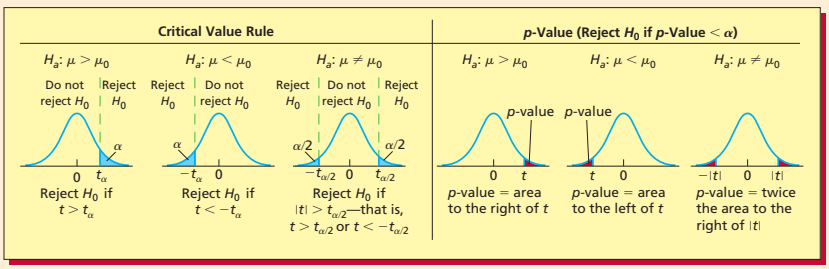
FIGURE 8.2 Three 95 Percent Confidence Intervals for μ



- In Chapter 9 (**Hypothesis Testing**), a five-step hypothesis testing procedure, **new graphical hypothesis testing summary boxes**, and many graphics are used to show how to carry out hypothesis tests.

A t Test about a Population Mean: σ Unknown

Null Hypothesis $H_0: \mu = \mu_0$ **Test Statistic** $t = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ $df = n - 1$ **Assumptions** Normal population or Large sample size



The Five Steps of Hypothesis Testing

1. State the null hypothesis H_0 and the alternative hypothesis H_a.
2. Specify the level of significance α.
3. Select the test statistic.

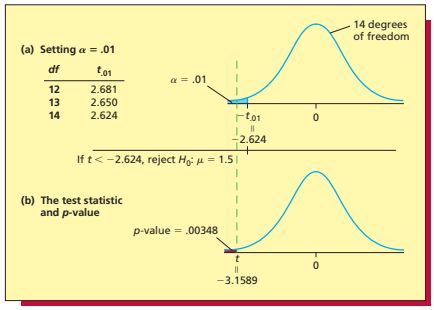
Using a critical value rule:

4. Determine the critical value rule for deciding whether to reject H_0.
5. Collect the sample data, compute the value of the test statistic, and decide whether to reject H_0 by using the critical value rule. Interpret the statistical results.

Using a p-value:

4. Collect the sample data, compute the value of the test statistic, and compute the p-value.
5. Reject H_0 at level of significance α if the p-value is less than α. Interpret the statistical results.

FIGURE 9.5 Testing $H_0: \mu = 1.5$ versus $H_a: \mu < 1.5$ by Using a Critical Value and the p-Value




```
Test of mu = 1.5 vs < 1.5

                                                95% Upper
Variable   N     Mean   StDev  SE Mean    Bound      T      P
Ratio     15   1.3433  0.1921   0.0496   1.4307  -3.16  0.003
```

- In Chapters 13 and 14 (**Simple Linear and Multiple Regression**), a substantial number of data plots, Excel and MINITAB outputs, and other graphics are used to teach simple and multiple regression analysis. For example, in **The Tasty Sub Shop Case** a business entrepreneur uses data plotted in Figures 14.1 and 14.2 and the Excel and MINITAB outputs in Figure 14.4 to predict the yearly revenue of a potential Tasty Sub Shop restaurant site on the basis of the population and business activity near the site. Using the **95 percent prediction interval** on the MINITAB output and projected restaurant operating costs, the entrepreneur decides whether to purchase a Tasty Sub Shop franchise for the potential restaurant site.

TEXT'S FEATURES

FIGURE 14.1 Plot of y (Yearly Revenue) versus x_1 (Population Size)

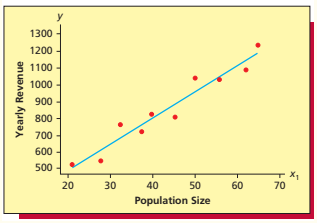


FIGURE 14.2 Plot of y (Yearly Revenue) versus x_2 (Business Rating)

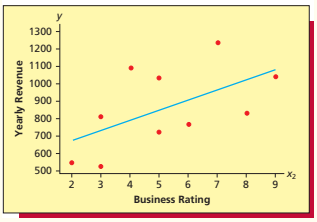


FIGURE 14.4 Excel and MINITAB Outputs of a Regression Analysis of the Tasty Sub Shop Revenue Data in Table 14.1 Using the Model $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$

(a) The Excel output

Regression Statistics

Multiple R	0.9905
R Square	0.9810 [8]
Adjusted R Square	0.9756 [9]
Standard Error	36.6856 [7]
Observations	10

ANOVA	df	SS	MS	F	Significance F
Regression	2	486355.7 [10]	243177.8	180.689 [13]	9.46E-07 [14]
Residual	7	9420.8 [11]	1345.835		
Total	9	495776.5 [12]			

	Coefficients	Standard Error [4]	t Stat [5]	P-value [6]	Lower 95% [19]	Upper 95% [19]
Intercept	125.289 [1]	40.9333	3.06	0.0183	28.4969	222.0807
population	14.1996 [2]	0.9100	15.60	1.07E-06	12.0478	16.3517
bus_rating	22.8107 [3]	5.7692	3.95	0.0055	9.1686	36.4527

(b) The MINITAB output

```
The regression equation is
revenue = 125 + 14.2 population + 22.8 bus_rating

Predictor        Coef      SE Coef [4]      T [5]      P [6]
Constant      125.29 [1]      40.93          3.06      0.018
population   14.1996 [2]       0.91          15.6      0.000
bus_rating    22.811 [3]      5.769          3.95      0.006
S = 36.6856 [7]          R-Sq = 98.10% [8]          R-Sq(adj) = 97.6% [9]

Analysis of Variance
Source           DF          SS          MS          F          P
Regression        2   486356 [10]      243178   180.69 [13]   0.000 [14]
Residual Error    7     9421 [11]        1346
Total             9   495777 [12]

Predicted Values for New Observations
New Obs        Fit [15]      SE Fit [16]          95% CI [17]          95% PI [18]
      1          956.6              15     (921.0, 992.2)       (862.8, 1050.4)

Values of Predictors for New Observations
New Obs    population    bus_rating
      1          47.3             7
```

[1] b_0 [2] b_1 [3] b_2 [4] s_{b_1} = standard error of the estimate b_j [5] t statistics [6] p-values for t statistics [7] s = standard error
[8] R^2 [9] Adjusted R^2 [10] Explained variation [11] SSE = Unexplained variation [12] Total variation [13] F(model) statistic
[14] p-value for F(model) [15] $\hat{y}$ = point prediction when x_1 = 47.3 and x_2 = 7 [16] $s_{\hat{y}}$ = standard error of the estimate $\hat{y}$
[17] 95% confidence interval when x_1 = 47.3 and x_2 = 7 [18] 95% prediction interval when x_1 = 47.3 and x_2 = 7 [19] 95% confidence interval for β_j

Exercises

Many of the exercises in the text require the analysis of real data. Data sets are identified by an icon in the text and are included on the Online Learning Center (OLC): www.mhhe.com/bowermaness5e. Exercises in each section are broken into two parts—"Concepts" and "Methods and Applications"—and there are supplementary and Internet exercises at the end of each chapter.

2.7 Below we give the overall dining experience ratings (Outstanding, Very Good, Good, Average, or Poor) of 30 randomly selected patrons at a restaurant on a Saturday evening. RestRating

Outstanding	Good	Very Good	Very Good	Outstanding	Good
Outstanding	Outstanding	Outstanding	Very Good	Very Good	Average
Very Good	Outstanding	Outstanding	Outstanding	Outstanding	Very Good
Outstanding	Good	Very Good	Outstanding	Very Good	Outstanding
Good	Very Good	Outstanding	Very Good	Good	Outstanding

a Find the frequency distribution and relative frequency distribution for these data.
b Construct a percentage bar chart for these data.
c Construct a percentage pie chart for these data.

Chapter Ending Material and Excel/MINITAB/MegaStat® Tutorials

The end-of-chapter material includes a chapter summary, a glossary of terms, important formula references, and comprehensive appendices that show students how to use Excel, MINITAB, and MegaStat.

Chapter Summary

We began this chapter by presenting and comparing several measures of **central tendency.** We defined the **population mean** and we saw how to estimate the population mean by using a **sample mean.** We also defined the **median** and **mode,** and we compared the mean, median, and mode for symmetrical distributions and for distributions that are skewed to the right or left. We then studied measures of **variation** (or *spread*). We defined the **range, variance,** and **standard deviation,** and we saw how to estimate a population variance and standard deviation by using a sample. We learned that a good way to interpret the standard deviation when a population is (approximately) normally distributed is to use the **Empirical Rule,** and we studied **Chebyshev's Theorem,** which gives us intervals containing reasonably large fractions of the population units no matter what the population's shape might be. We also saw that, when a data set is highly skewed, it is best to use **percentiles** and **quartiles** to measure variation, and we learned how to construct a **box-and-whiskers plot** by using the quartiles.

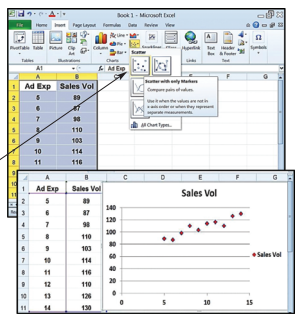
After learning how to measure and depict central tendency and variability, we presented several optional topics. First, we discussed several numerical measures of the relationship between two variables. These included the **covariance,** the **correlation coefficient,** and the **least squares line.** We then introduced the concept of a **weighted mean** and also explained how to compute descriptive statistics for **grouped data.** Finally, we showed how to calculate the **geometric mean** and demonstrated its interpretation.

Glossary of Terms

box-and-whiskers display (box plot): A graphical portrayal of a data set that depicts both the central tendency and variability of the data. It is constructed using Q_1, M_d, and Q_3. (pages 121, 122)
central tendency: A term referring to the middle of a population or sample of measurements. (page 99)
outlier (in a box-and-whiskers display): A measurement less than the lower limit or greater than the upper limit. (page 122)
percentile: The value such that a specified percentage of the measurements in a population or sample fall at or below it. (page 118)
point estimate: A one-number estimate for the value of a population parameter. (page 99)

Constructing a scatter plot of sales volume versus advertising expenditure as in Figure 2.24 on page 67 (data file: SalesPlot.xlsx):

- Enter the advertising and sales data in Table 2.20 on page 67 into columns A and B—advertising expenditures in column A with label "Ad Exp" and sales values in column B with label "Sales Vol." **Note: The variable to be graphed on the horizontal axis must be in the first column** (that is, the left-most column) and **the variable to be graphed on the vertical axis must be in the second column** (that is, the rightmost column).
- Select the entire range of data to be graphed.
- Select **Insert : Scatter : Scatter with only Markers**
- The scatter plot will be displayed in a graphics window. Move the plot to a chart sheet and edit appropriately.

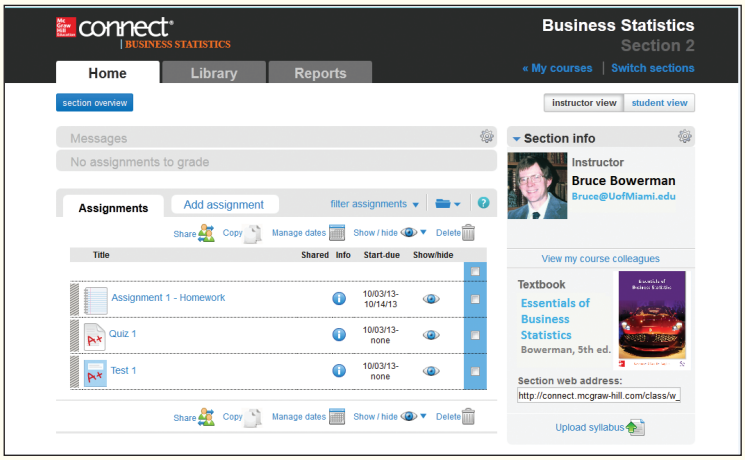


WHAT TECHNOLOGY CONNECTS STUDENTS...

connect plus+
BUSINESS STATISTICS

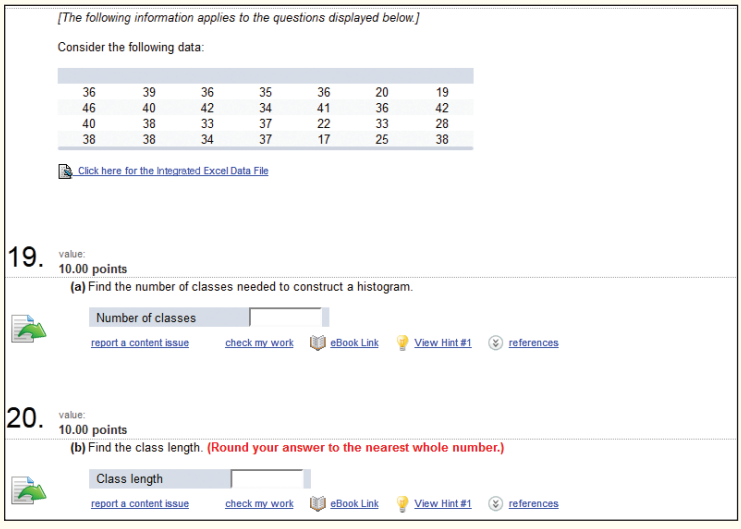
McGraw-Hill *Connect*® *Business Statistics* is an online assignment and assessment solution that connects students with the tools and resources they'll need to achieve success through faster learning, higher retention, and more efficient studying. It provides instructors with tools to quickly pick content and assignments according to the topics they want to emphasize.

Online Assignments. *Connect Business Statistics* helps students learn more efficiently by providing practice material and feedback when they are needed. *Connect* grades homework automatically and provides feedback on any questions that students may have missed.



Integration of Excel Data Sets. A convenient feature is the inclusion of an Excel data file link in many problems using data files in their calculation. The link allows students to easily launch into Excel, work the problem, and return to *Connect* to key in the answer.

Student Resource Library. The *Connect Business Statistics* Student Library is the place for students to access additional resources. The Student Library provides quick access to recorded lectures, practice materials, eBooks, data files, PowerPoint files, and more.



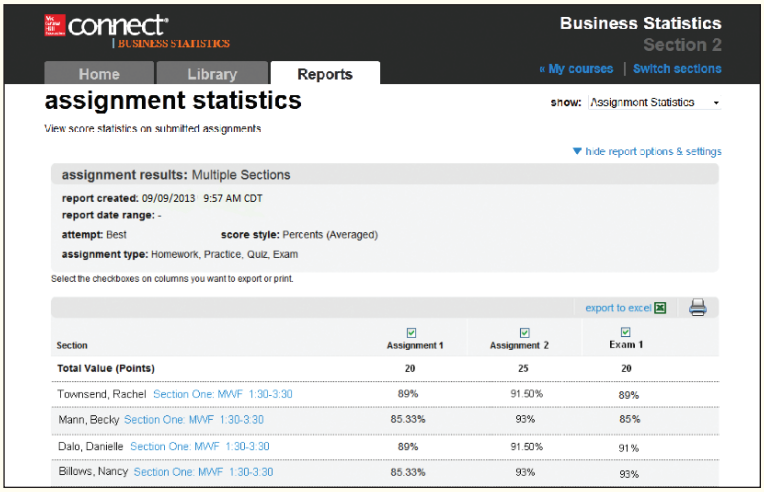
TO SUCCESS IN BUSINESS STATISTICS?

Simple Assignment Management and Smart Grading. When it comes to studying, time is precious. *Connect Business Statistics* helps students learn more efficiently by providing feedback and practice material when they need it, where they need it. When it comes to teaching, your time also is precious. The grading function enables you to:

- Have assignments scored automatically, giving students immediate feedback on their work and side-by-side comparisons with correct answers.
- Access and review each response; manually change grades or leave comments for students to review.

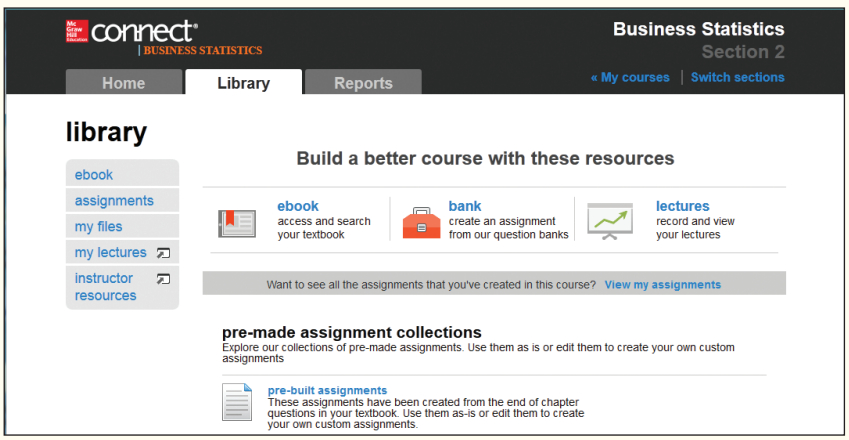
Student Reporting. *Connect Business Statistics* keeps instructors informed about how each student, section, and class is performing, allowing for more productive use of lecture and office hours. The progress-tracking function enables you to:

- View scored work immediately and track individual or group performance with assignment and grade reports.
- Access an instant view of student or class performance relative to learning objectives.
- Collect data and generate reports required by many accreditation organizations, such as AACSB.



Instructor Library. The *Connect Business Statistics* Instructor Library is your repository for additional resources to improve student engagement in and out of class. You can select and use any asset that enhances your lecture. The *Connect Business Statistics* Instructor Library includes:

- eBook
- PowerPoint presentations
- Test Bank
- Instructor's Solutions Manual
- Digital Image Library



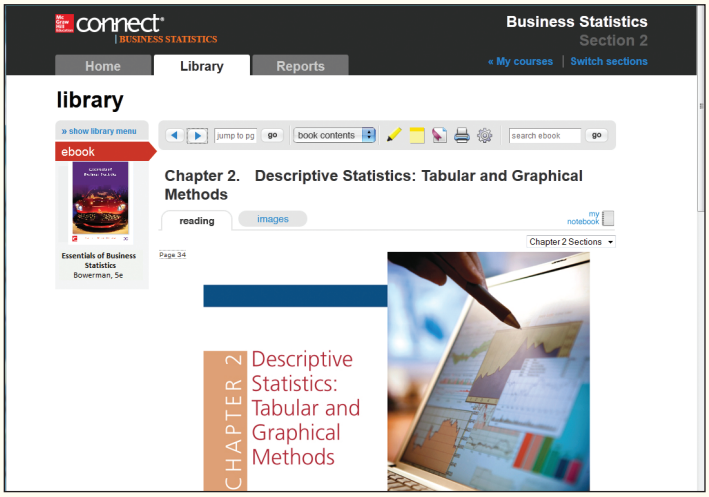
WHAT TECHNOLOGY CONNECTS STUDENTS...

connect™ plus+
BUSINESS STATISTICS

Connect*® *Plus Business Statistics includes a seamless integration of an eBook and *Connect Business Statistics.* Benefits of the rich functionality integrated into the product are outlined below.

Integrated Media-Rich eBook. An integrated media-rich eBook allows students to access media in context with each chapter. Students can highlight, take notes, and access shared instructor highlights and notes to learn the course material.

Dynamic Links. Dynamic links provide a connection between the problems or questions you assign to your students and the location in the eBook where that problem or question is covered.



Powerful Search Function. A powerful search function pinpoints and connects key concepts in a snap. This state-of-the-art, thoroughly tested system supports you in preparing students for the world that awaits. For more information about *Connect*, go to www.mcgrawhillconnect.com or contact your local McGraw-Hill sales representative.

Connect Packaging Options

Connect with 1 Semester Access Card: 0077641159
Connect Plus with 1 Semester Access Card: 0077641183

Tegrity Campus: Lectures 24/7

Tegrity Campus is a service that makes class time available 24/7. With *Tegrity Campus,* you can automatically capture every lecture in a searchable format for students to review when they study and complete assignments. With a simple one-click start-and-stop process, you capture all computer screens and corresponding audio. Students can replay any part of any class with easy-to-use browser-based viewing on a PC or Mac.

Educators know that the more students can see, hear, and experience class resources, the better they learn. In fact, studies prove it. With *Tegrity Campus,* students quickly recall key moments by using *Tegrity Campus*'s unique search feature. This search helps students efficiently find what they need, when they need it, across an entire semester of class recordings. Help turn all your students' study time into learning moments immediately supported by your lecture. To learn more about *Tegrity,* watch a two-minute Flash demo at http://tegritycampus.mhhe.com.

TO SUCCESS IN BUSINESS STATISTICS?

WHAT SOFTWARE IS AVAILABLE?

MegaStat® for Microsoft Excel®—Windows® and Mac OS-X: www.mhhe.com/megastat

MegaStat is a full-featured Excel add-in by J. B. Orris of Butler University that is available with this text. The online installer will install the MegaStat add-in for all versions of Microsoft Excel beginning with Excel 2007 and up to Excel 2013. MegaStat performs statistical analyses within an Excel workbook. It does basic functions such as descriptive statistics, frequency distributions, and probability calculations, as well as hypothesis testing, ANOVA, and regression.

MegaStat output is carefully formatted. Ease-of-use features include AutoExpand for quick data selection and Auto Label detect. Since MegaStat is easy to use, students can focus on learning statistics without being distracted by the software. MegaStat is always available from Excel's main menu. Selecting a menu item pops up a dialog box. MegaStat works with all recent versions of Excel.

MINITAB® (ISBN: 007305237x)

Minitab® Student Version 14 is available to help students solve the business statistics exercises in the text. This software is available in the student version and can be packaged with any McGraw-Hill business statistics text.

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