

Introduction to Business Analytics

Vernon J. Richardson

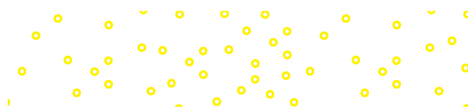
University of Arkansas

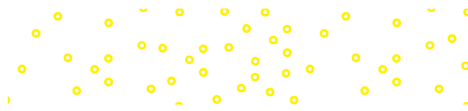
Baruch College

Marcia Weidenmier Watson

Trinity University

**Mc
Graw
Hill**





INTRODUCTION TO BUSINESS ANALYTICS

Published by McGraw Hill LLC, 1325 Avenue of the Americas, New York, NY 10019. Copyright ©2024 by McGraw Hill LLC. All rights reserved. Printed in the United States of America. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of McGraw Hill LLC, including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning.

Some ancillaries, including electronic and print components, may not be available to customers outside the United States.

This book is printed on acid-free paper.

1 2 3 4 5 6 7 8 9 LWI 28 27 26 25 24 23 22

ISBN 978-1-265-45434-0 (bound edition)

MHID 1-265-45434-5 (bound edition)

ISBN 978-1-265-45017-5 (loose-leaf edition)

MHID 1-265-45017-X (loose-leaf edition)

Portfolio Manager: Eric Weber

Product Developer: Steven Rigolosi

Marketing Manager: Harper Christopher

Content Project Managers: Jill Eccher

Manufacturing Project Manager: Rachel Hirschfield

Designer: David W. Hash

Content Licensing Specialist: Lori Hancock

Cover Image: Matt Anderson Photography/Getty Images

Compositor: Straive

All credits appearing on page or at the end of the book are considered to be an extension of the copyright page.

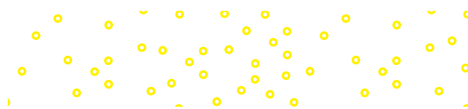
Library of Congress Cataloging-in-Publication Data

Cataloging-in-Publication Data has been requested from the Library of Congress.

LCCN: 2022046170

The Internet addresses listed in the text were accurate at the time of publication. The inclusion of a website does not indicate an endorsement by the authors or McGraw Hill LLC, and McGraw Hill LLC does not guarantee the accuracy of the information presented at these sites.

mheducation.com/highered



The McGraw Hill Series in Operations and Decision Sciences

SUPPLY CHAIN MANAGEMENT

Bowersox, Closs, Cooper, and Bowersox
Supply Chain Logistics Management
Sixth Edition

Johnson
Purchasing and Supply Management
Seventeenth Edition

Simchi-Levi, Kaminsky, and Simchi-Levi
Designing and Managing the Supply Chain: Concepts, Strategies, Case Studies
Fourth Edition

Stock and Manrodt
Fundamentals of Supply Chain Management

PROJECT MANAGEMENT

Larson and Gray
Project Management: The Managerial Process
Eighth Edition

SERVICE OPERATIONS MANAGEMENT

Bordoloi, Fitzsimmons, and Fitzsimmons
Service Management: Operations, Strategy, Information Technology
Tenth Edition

MANAGEMENT SCIENCE

Hillier and Hillier
Introduction to Management Science and Business Analytics: A Modeling and Case Studies Approach with Spreadsheets
Seventh Edition

BUSINESS RESEARCH METHODS

Schindler
Business Research Methods
Fourteenth Edition

BUSINESS FORECASTING

Keating and Wilson
Forecasting and Predictive Analytics
Seventh Edition

BUSINESS SYSTEMS DYNAMICS

Sterman
Business Dynamics: Systems Thinking and Modeling for a Complex World

OPERATIONS MANAGEMENT

Cachon and Terwiesch
Operations Management
Third Edition

Cachon and Terwiesch
Matching Supply with Demand: An Introduction to Operations Management
Fifth Edition

Jacobs and Chase
Operations and Supply Chain Management
Seventeenth Edition

Jacobs and Chase
Operations and Supply Chain Management: The Core
Sixth Edition

Schroeder and Goldstein
Operations Management in the Supply Chain: Decisions and Cases
Eighth Edition

Stevenson
Operations Management
Fourteenth Edition

Swink, Melnyk, and Hartley
Managing Operations Across the Supply Chain
Fifth Edition

BUSINESS STATISTICS

Bowerman, Drougas, Duckworth, Froelich, Hummel, Moninger, and Schur
Business Statistics and Analytics in Practice
Ninth Edition

Doane and Seward
Applied Statistics in Business and Economics
Seventh Edition

Doane and Seward
Essential Statistics in Business and Economics
Third Edition

Lind, Marchal, and Wathen
Basic Statistics for Business and Economics
Tenth Edition

Lind, Marchal, and Wathen
Statistical Techniques in Business and Economics
Nineteenth Edition

Jaggia and Kelly
Business Statistics: Communicating with Numbers
Fourth Edition

Jaggia and Kelly
Essentials of Business Statistics: Using Excel
Third Edition

BUSINESS ANALYTICS

Jaggia, Kelly, Lertwachara, and Chen
Business Analytics: Communicating with Numbers
Second Edition

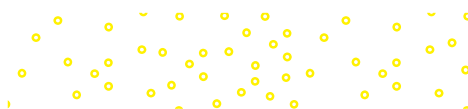
Richardson, Weidenmier Watson
Introduction to Business Analytics

Taddy, Hendrix, Harding
Modern Business Analytics

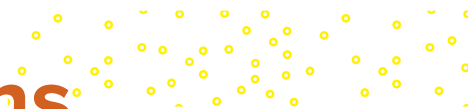
BUSINESS MATH

Slater and Wittry
Practical Business Math Procedures
Fourteenth Edition

Slater and Wittry
Math for Business and Finance: An Algebraic Approach
Third Edition



Dedications

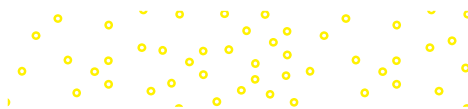


**My most amazing son, Benjamin, who makes me
laugh and recognize that life is for experiencing joy.
Love you!**

—Vern Richardson

**My family, whose love and support allow my dreams
to come true. Thank you!**

—Marcia Weidenmier Watson



About the Authors

Vernon J. Richardson is Distinguished Professor of Accounting and the G. William Glezen Chair in the Sam M. Walton College of Business at the University of Arkansas and visiting professor at Baruch College. He received his BS, Master of Accountancy, and MBA from Brigham Young University and his PhD in accounting from the University of Illinois at Urbana–Champaign. He has taught students at the University of Arkansas, University of Illinois, Brigham Young University, and University of Kansas and internationally at the China Europe International Business School (Shanghai), Xi’an Jiaotong Liverpool University, Chinese University of Hong Kong Shenzhen, Aarhus University, and the University of Technology Sydney.



Vernon J. Richardson

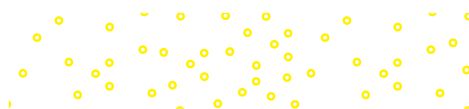
Dr. Richardson is a member of the American Accounting Association and has served as president of the American Accounting Association Information Systems section. He previously served as an editor of *The Accounting Review* and is currently an editor at *Accounting Horizons*. He has published articles in *The Accounting Review*, *Journal of Information Systems*, *Journal of Accounting and Economics*, *Contemporary Accounting Research*, *MIS Quarterly*, *International Journal of Accounting Information Systems*, *Journal of Management Information Systems*, *Journal of Operations Management*, and *Journal of Marketing*. He is also a co-author of McGraw Hill’s *Accounting Information Systems*, *Introduction to Data Analytics for Accounting*, and *Data Analytics for Accounting* textbooks.

Marcia Weidenmier Watson is the Jesse H. Jones Professor Accounting in the Michael Neidorff School of Business at Trinity University. She received her BBA in accounting from the College of William and Mary, and both an MBA in information systems management and accounting and a PhD in accounting from the University of Texas at Austin. She has taught at the University of Texas at Austin, TCU, Mississippi State University, UNC Charlotte, and Trinity University. Prior to receiving her PhD, Dr. Watson was a financial systems consultant for Price Waterhouse, now PricewaterhouseCoopers.



Marcia Weidenmier Watson

A member of the American Accounting Association, she served as newsletter editor for the American Accounting Association Information Systems section for 16 years. She serves on the editorial boards of *Issues in Accounting Education* and the *Journal of Accounting Education*. She has published articles in *Accounting Horizons*, *Advances in Management Accounting*, *Issues in Accounting Education*, *International Journal of Accounting Information Systems*, *MIS Quarterly*, *Journal of Accountancy*, *Journal of Accounting Education*, *Journal of Information Systems*, and *Strategic Finance*. She also has had several cases published in *Case Studies in Forensic Accounting and Fraud Auditing*.



From the Authors

Computerization and automation of many business tasks is combining with the explosion of available data to change the way companies work and make decisions. For this reason, business professionals are increasingly required to have an **analytics mindset** to perform their jobs. We recognize that students need to develop the skills to ask the right questions, learn to use common workplace tools (such as Excel®, Tableau®, and Power BI®) to examine and analyze data, and interpret results accurately and effectively to make business decisions.

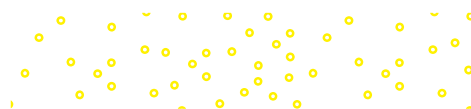
Developing this analytics mindset early in the study of business is crucial in preparing students to meet the demands of today's workplace. It is also critical in terms of developing business acumen and understanding how basic business functions work. In addition, learning multiple software packages develops technical agility. An analytics mindset, business acumen, and technical agility are essential in preparing students not only for future business classes but also for their internships and post-graduation jobs in the real world.

Introduction to Business Analytics provides a framework for developing a business analytics mindset. This framework, which we call the **SOAR analytics model**, is composed of four steps:

1. Specify the question (Chapter 1)
2. Obtain the data (Chapters 2–3)
3. Analyze the data (Chapters 4, 5, and 11)
4. Report the results (Chapter 6)

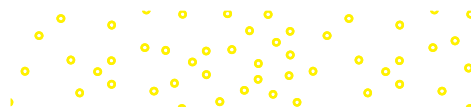


This model is used throughout the text in conjunction with the various types of data analysis that analysts need to perform. The lab activities, which appear at the end of each chapter, follow this framework to reinforce the analytical process.



After laying the foundation in Chapters 1–6, we apply the SOAR model in Chapters 7–10 to marketing, accounting, finance, and operations questions. Chapter 11 introduces advanced analytics and discusses how powerful machine learning and other algorithms can improve business analytics. Chapter 12 acts as a capstone, providing three projects that apply the complete SOAR model. The first project asks students to identify the factors that affect Airbnb rental rates, and the second project asks students to analyze LendingClub loans. The third project asks students to use the SOAR framework to address a business question that they have posed.

Vernon J. Richardson
Marcia Weidenmier Watson



Key Features

Focus on Building Skills with Excel®, Tableau®, and Power BI®.

Students learn how to conduct business analytics using Excel, Tableau, and Power BI—three software tools that are widely used by businesses today.

CHAPTER 7 LABS

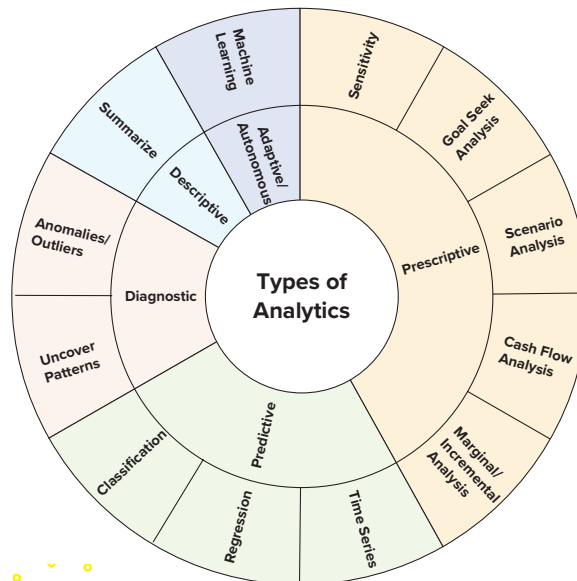
- LAB 7.1 **Excel:** Descriptive Analytics: Analyzing Company Historical Performance
- LAB 7.2 **Excel:** Descriptive Analytics: Using a Pivot Table to Analyze Historical Performance by Product Size and Year
- LAB 7.3 **Tableau:** Descriptive Analytics: Using a Histogram to Evaluate Process Time
- LAB 7.3 **Power BI:** Descriptive Analytics: Using a Histogram to Evaluate Process Time
- LAB 7.4 **Excel:** Diagnostic Analytics: Analyzing the Steps in the Sales Process with a Sales Funnel Chart
- LAB 7.5 **Tableau:** Diagnostic Analytics: Examining Pricing Strategy with Cluster Analysis
- LAB 7.6 **Excel:** Predictive Analytics: Predicting Sales Revenue from Advertising Expense
- LAB 7.6 **Tableau:** Predictive Analytics: Predicting Sales Revenue from Advertising Expense
- LAB 7.7 **Excel:** Prescriptive Analytics: Calculating Internet CPM Rate Using Goal Seek
- LAB 7.8 **Excel:** Prescriptive Analytics: Calculating Product Price Using Goal Seek

Focus on Building Critical Thinking Skills.

From learning to ask the right questions to interpreting and presenting results, *Introduction to Business Analytics* fosters critical thinking and develops business analysis skills. It teaches students how to use descriptive, diagnostic, predictive, prescriptive, and advanced analytics to answer the following business questions:

1. **Descriptive analytics:** What happened? What is happening? (Chapter 4)
2. **Diagnostic analytics:** Why did it happen? What are the causes of past results? Why are the results different than expectations? (Chapter 4)
3. **Predictive analytics:** Will it happen in the future? What is the probability something will happen? Can we forecast what will happen? (Chapter 5)
4. **Prescriptive analytics:** What should we do, based on what we expect will happen? How do we optimize our performance based on potential constraints? (Chapter 5)
5. **Adaptive/autonomous analytics:** How can we continuously learn using artificial intelligence? Can we learn from past and current events with adaptive learning? (Chapter 11)

The following diagram summarizes the techniques taught.



Emphasis on the Real-World Use of Data.

Mini Cases in each chapter ask students to consider real-world companies and how they can use data to inform their decision-making.

MINI CASE: Tide PODS and Data Types

How are data types identified and included in a product database like the one Amazon maintains? Exhibit 2.11 is a screenshot from Amazon showing a listing for Tide PODS. It identifies the type of data for each field and suggests how each data type could be stored in a structured table.

As you read the different callout boxes, you will recognize terms that you learned earlier in the chapter, including numerical data and categorical data. You will also notice a new term: flag. Two data types in Exhibit 2.11 are denoted as a flag, which is a term used when there are only two options for a given field. Here, Amazon denotes two database items as flags: whether an item is prime or not, and whether the item is currently in stock or out of stock.

Exhibit 2.11
Tide PODS Amazon: Customer View
(Source: Amazon.com.)

Focus on Data Visualization.

The text emphasizes the creation and interpretation of various types of data visualizations useful in summarizing data and making decisions, including histograms, line graphs, pie charts, and scatterplots.



DATA VISUALIZATION



Lab Exhibit 6.SP.6
Microsoft Power BI

Hands-on Labs.

Introduction to Business Analytics offers more than 60 hands-on labs, each using Excel, Tableau, or Power BI. Each lab has two data sets. The first is used with the step-by-step instructions (with screenshots) presented in the text. The second, alternate data set gives students the opportunity to apply what they learned by using the first data set. Lab assessment appears in Connect through the use of multiple-choice questions. Video tutorials of the Labs are also available in Connect.

Lab 7.2 Excel

Lab Note: The tools presented in this lab periodically change. Updated instructions, if applicable, can be found in the student and instructor support materials.

Descriptive Analytics: Using a Pivot Table to Analyze Historical Performance by Product Size and Year

Keywords

Descriptive Analytics, Pivot Table

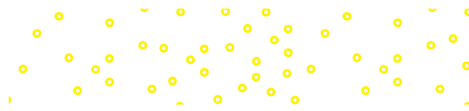
Decision-Making Context

Understanding what happened in the past is an important first step in harnessing the power of business analytics. Descriptive analytics answers the questions “What happened?” and “What is happening?” Lab 7.1 used the Analysis ToolPak in Excel to generate descriptive analytics for marketing data. This lab uses Excel pivot tables to summarize the data at different levels, allowing drill down and drill up (also known as roll up).

Several years ago, Rob built a table for his son to use in building LEGO creations. The table allowed his son to stand while building, provided a frame to hold LEGO base plates, and got the LEGOs off the floor. Several of Rob’s neighbors saw the table and asked him to build tables for their children. The tables grew in popularity and Rob eventually quit his job in 2018 and founded LcTable Inc. He now works full-time building custom LEGO tables.

Customers select from four different sizes of tables:

1. Small, which holds 4 base plates
2. Medium, which holds 8 base plates
3. Large, which holds 16 base plates
4. Deluxe, which has multiple levels as well as conduits for electric lights



Progress Checks.

Progress Check questions posed at key points in each chapter encourage students to consider and apply the concepts presented.

✓ PROGRESS CHECK

- Which types of data that are internal to the company would be useful in preparing a sales forecast for the next quarter? Which types of data that are external to the company would be meaningful for the same purpose?
- How can a business analyst use data from the U.S. Census Bureau to understand the demographics of a company's customer base?
- How can companies improve their traditional business analytics by including Big Data sources such as social media or data from the Internet of Things?



ETHICS

Ethical Use of Data.

Each chapter includes a discussion of important questions related to the ethical collection, use, and sale of data.

Checklist for Creating Effective Charts That Clearly Answer Business Questions

In *How Charts Lie*, Alberto Cairo describes the many ways that a chart might lie, confuse, manipulate, and mislead.⁴ Culprits include:

- poor design
- the use of incorrect or an inappropriate amount of data
- the concealment of data
- the suggestion of misleading patterns
- support for pre-existing desired outcomes, opinions, or assumptions
- unclear communication of uncertainty.

For example, the cone of uncertainty used by the U.S. National Hurricane Center (USNC) indicates the likelihood of a hurricane path. The less certain meteorologists are of the hurricane's path, the wider the cone. However, most people incorrectly interpret the map as depicting how the hurricane will strengthen over time, which means that the USNC's chart is problematic.

To become a skilled and ethical creator of data visualizations, Cairo recommends examining many charts and graphs while "being aware of . . . biases and learning to see what charts and graph *don't* necessarily show."⁵ He also recommends applying the Golden Rule when you are creating charts: If you don't like being tricked, don't trick other people.

As you think about the data visualizations that you will use to convey information, consider the following questions: How often do you think people deliberately use charts and other data visualizations to mislead or deceive others? What questions should you ask about charts created by others? What questions should you ask about your own charts before you make them public? How might your chart be misinterpreted? Why should you look at the data underlying a chart?

End-of-Chapter Assessment.

The end-of-chapter assignments include real-world application questions, with an emphasis on skills and tools. Each chapter offers discussion questions, exercises, and problems to reinforce learning.

Problems

- (LO 7.1, 7.4, 7.5, 7.6, 7.7) This chapter focuses on the traditional four Ps of the marketing mix (product, price, place, and promotion) and briefly introduced additional Ps: planning, process, people, and physical evidence. Process is the flow of activities that takes place when the company interacts with a customer. For example, the activities to return a product to **Home Depot** include: (1) Customer enters the Customer Service Desk line; (2) employee listens to customer request; (3) customer presents an item to return; (4) employee verifies the receipt and the item condition; (5) employee approves the return, obtaining manager help/approval when necessary; (6) employee enters information into the system including the reason for the return; and (7) employee provides the customer with a refund. Identify questions related to this process that Home Depot could ask that would require descriptive, diagnostic, predictive, and prescriptive analytics (one question for each type).
- (LO 7.1, 7.4, 7.5, 7.6, 7.7) This chapter focuses on the traditional four Ps of the marketing mix (product, price, place, and promotion) and briefly introduced additional Ps: planning, process, people, and physical evidence. People refers to having the proper employees with appropriate skills sets or leadership skills. For example, the **Ford Motor Company** needs great salespeople to sell its cars and trucks. Identify questions related to the sales force that Ford could ask that would require descriptive, diagnostic, predictive, and prescriptive analytics to answer (one question for each type).
- (LO 7.4, 7.5, 7.6, 7.7) **Panera Bread** sends out emails to customers to entice them to come and purchase food. Companies can tell if (and when) customers open emails. Assume that Panera Bread wants to use regression to determine if email open rates are related to subsequent food purchases. What are the independent and dependent variables in the regression? What additional variables would you suggest adding to the regression?
- (LO 7.5, 7.6) This chapter describes sources of marketing data, including customers' web search history, social media posts, and purchase history. Analyzing this information can reveal private information, such as financial problems, illness, and pregnancy. The following story appeared in both *Fortune* and *The New York Times*, but it has never been confirmed by **Target**. The story provides a good opportunity to understand what could potentially be done with marketing data. A father found out that his teenage daughter was pregnant when Target began sending coupons for baby products to her (based on her purchases).⁶ What type of diagnostic and predictive analytics could Target have used to determine that the teenager was pregnant? How can each of these techniques be used in marketing?

Available in Connect

SmartBook[®]

Is the market-leading adaptive study resource that is proven to strengthen memory recall, increase retention, and boost grades. SmartBook 2.0 identifies and closes knowledge gaps through a continually adapting reading and questioning experience that helps students master the key concepts in each chapter.

0 of 41 Concepts completed

Multiple Choice Question

What process involves the technologies, systems, practices, methodologies, databases, statistics, and applications used to analyze diverse business data to give organizations the information they need to make decisions?

- Systems Analysis
- Data Analytics
- Big Data
- Business Process Analytics

Need help? Review these concept resources.

Read About the Concept

Rate your confidence to submit your answer: High Medium Low

Reading

© 2022 McGraw Hill. All Rights Reserved. Privacy | Terms of Use

Identifying Anomalies and Outliers: What's the Expectation?

Accounting	Business	Financial	Human Resources
The increase in sales is slightly equivalent to the increase in sales for other industries.	Our company sales grew at twice the rate of our competitors.	Our company sales are particularly weak during an increase in sales.	Our company sales are particularly weak during an increase in sales.
The employee turnover rate will be roughly equivalent to the rate experienced last year by our company.	Our employee turnover rate is higher than what the company experienced last year.	Our employee turnover rate is higher than what the company experienced last year.	Our employee turnover rate is higher than what the company experienced last year.
Accountants record transactions in conformity with Generally Accepted Accounting Principles (GAAP).	Our company's bond portfolio includes U.S. government treasury bonds.	Our company's bond portfolio includes U.S. government treasury bonds.	Our company's bond portfolio includes U.S. government treasury bonds.

Complete this assignment by answering the 3 questions below.

Question 1 Question 2 Question 3

Which higher level of Bloom's Taxonomy covers breaking down information into component parts?

Create

Lecture Videos:

These video-based tutorials are designed to reinforce select chapter concepts.

P 4-9 (LO 4.3, 4.4) Which has the highest return on investment...

Which has the highest return on investment—the S&P 500, high-grade corporate bonds, or U.S. Treasury bonds? Download the [Investment Returns data set in Excel](https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html). The source is Aswath Damodaran, NYU Finance Professor, at https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html

Required:

1. Calculate the average returns for the S&P 500 stock index, high-grade corporate bonds, and U.S. Treasury bonds from 1928 to 2020. Which has the highest return?
2. Calculate the standard deviation of returns to the S&P 500 stock index, high-grade corporate bonds, and U.S. Treasury bonds from 1928 to 2020. Which has the highest standard deviation of returns? (Hint: Use the STDEV.S Excel function for each index. STDEV.S calculates the standard deviation for a sample.)
3. Generally we expect that the higher the risk, the greater the expected return. Which of these three investments has the highest risk (measured here as standard deviation of returns), and which has the greatest return?

Complete this question by entering your answers in the tabs below.

Required 1 Required 2 Required 3

Calculate the average returns for the S&P 500 stock index, high-grade corporate bonds, and U.S. Treasury bonds from 1928 to 2020. Which has the highest return?
Note: Round your answers to 2 decimal places.

S&P 500 Stock Index %
High-Grade Corporate Bonds %
U.S. Treasury Bonds %

Exercises/Problems:

Select exercises and problems from the text are available for assignment in Connect to ensure students are building an analytical skill set.

Lab 4.2 (Static) Excel: Using Conditional Formatting to Perform a Bank Reconciliation

[The following information applies to the questions displayed below.]

Keywords: Diagnostic Analytics, General Ledger, Bank Reconciliation, Conditional Formatting

Decision-Making Context: An important internal control for cash is a bank reconciliation, which reconciles the company's cash general ledger account to the company's bank statement. The cash transactions (cash, checks, and other deposits) that are not recorded in both the bank statement and the company's general ledger need to be reconciled.

To perform a reconciliation, the company needs to reconcile the cash balance recorded in its general ledger (GL) with the cash that the bank collected or charged (disbursed) without the company's knowledge. The company also needs to reconcile the cash balance on its bank statement with the transactions recorded in the GL but not known at the bank. Reconciliations help us find recording errors (or possible fraudulent actions) that either the bank or the company made.

In this lab, you will use conditional formatting to find items that need to be reconciled. Specifically, you will use conditional formatting to find GL cash transactions that are different from those reported by the bank. In this case, conditional formatting reveals the unique items in the two columns of numbers that will be important to our cash reconciliation.

Introduction to Business Analytics
Lab 4.2 Using Conditional Formatting to Perform a Bank Reconciliation
Walkthrough Video with Example Data
Microsoft Excel 365 (2022)

Labs with Lab Assessments:

While the labs require students to work outside of Connect in Excel, Tableau, and/or Power BI, Connect allows students to upload their results and answer analytical questions designed to reinforce the lessons from each chapter.

Lab Help Videos:

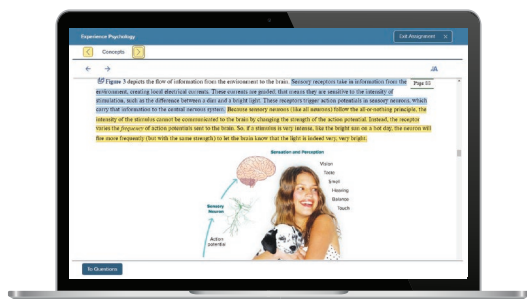
Help videos for each lab provide a step-by-step tutorial that walks students through the assigned analysis tasks in Excel, Tableau, and Power BI.

Instructors Student Success Starts with You

Tools to enhance your unique voice

Want to build your own course? No problem. Prefer to use an OLC-aligned, prebuilt course? Easy. Want to make changes throughout the semester? Sure. And you'll save time with Connect's auto-grading, too.

65%
Less Time
Grading



Laptop: Getty Images; Woman/dog: George Doyle/Getty Images

A unique path for each student

In Connect, instructors can assign an adaptive reading experience with SmartBook[®] 2.0. Rooted in advanced learning science principles, SmartBook 2.0 delivers each student a personalized experience, focusing students on their learning gaps, ensuring that the time they spend studying is time well-spent.

mheducation.com/highered/connect/smartbook

Affordable solutions, added value

Make technology work for you with LMS integration for single sign-on access, mobile access to the digital textbook, and reports to quickly show you how each of your students is doing. And with our Inclusive Access program, you can provide all these tools at the lowest available market price to your students. Ask your McGraw Hill representative for more information.

Solutions for your challenges

A product isn't a solution. Real solutions are affordable, reliable, and come with training and ongoing support when you need it and how you want it. Visit supportateverystep.com for videos and resources both you and your students can use throughout the term.

Students

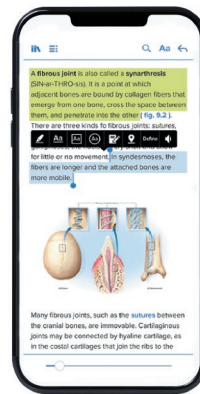
Get Learning that Fits You

Effective tools for efficient studying

Connect is designed to help you be more productive with simple, flexible, intuitive tools that maximize your study time and meet your individual learning needs. Get learning that works for you with Connect.

Study anytime, anywhere

Download the free ReadAnywhere® app and access your online eBook, SmartBook® 2.0, or Adaptive Learning Assignments when it's convenient, even if you're offline. And since the app automatically syncs with your Connect account, all of your work is available every time you open it. Find out more at mheducation.com/readanywhere



“I really liked this app—it made it easy to study when you don't have your textbook in front of you.”

- Jordan Cunningham,
Eastern Washington University

iPhone: Getty Images



Everything you need in one place

Your Connect course has everything you need—whether reading your digital eBook or completing assignments for class, Connect makes it easy to get your work done.

Learning for everyone

McGraw Hill works directly with Accessibility Services Departments and faculty to meet the learning needs of all students. Please contact your Accessibility Services Office and ask them to email accessibility@mheducation.com, or visit mheducation.com/about/accessibility for more information.



Also Available with Connect

Proctorio

Remote Proctoring & Browser-Locking Capabilities



Remote proctoring and browser-locking capabilities, hosted by Proctorio within Connect, provide control of the assessment environment by enabling security options and verifying the identity of the student.

Seamlessly integrated within Connect, these services allow instructors to control the assessment experience by verifying identification, restricting browser activity, and monitoring student actions.

Instant and detailed reporting gives instructors an at-a-glance view of potential academic integrity concerns, thereby avoiding personal bias and supporting evidence-based claims.



ReadAnywhere[®]

Read or study when it's convenient for you with McGraw Hill's free ReadAnywhere[®] app. Available for iOS or Android smartphones or tablets, ReadAnywhere gives users access to McGraw Hill tools including the eBook and SmartBook[®] 2.0 or Adaptive Learning Assignments in Connect. Take notes, highlight, and complete assignments offline—all of your work will sync when you open the app with Wi-Fi access. Log in with your McGraw Hill Connect username and password to start learning—anytime, anywhere!

OLC-Aligned Courses

Implementing High-Quality Instruction and Assessment through Preconfigured Courseware

In consultation with the Online Learning Consortium (OLC) and our certified Faculty Consultants, McGraw Hill has created pre-configured courseware using OLC's quality scorecard to align with best practices in online course delivery. This turnkey courseware contains a combination of formative assessments, summative assessments, homework, and application activities, and can easily be customized to meet an individual instructor's needs and desired course outcomes. For more information, visit <https://www.mheducation.com/highered/olc>.

Tegrity: Lectures 24/7

Tegrity in Connect is a tool that makes class time available 24/7 by automatically capturing every lecture. With a simple one-click start-and-stop process, you can capture all computer screens and corresponding audio in a format that is easy to search, frame by frame. Students can replay any part of any class with easy-to-use, browser-based viewing on a PC, Mac, or mobile device.

Educators know that the more students can see, hear, and experience class resources, the better they learn. In fact, studies prove it. Tegrity's unique search feature helps students efficiently find what they need, when they need it, across an entire semester of class recordings. Help turn your students' study time into learning moments immediately supported by your lecture. With Tegrity, you also increase intent listening and class participation by easing students' concerns about note-taking. Using Tegrity in Connect will make it more likely you will see students' faces, not the tops of their heads.





Test Builder in Connect

Available within Connect, Test Builder is a cloud-based tool that enables instructors to format tests that can be printed, administered within a Learning Management System, or exported as a Word document. Test Builder offers a modern, streamlined interface for easy content configuration that matches course needs, without requiring a download.

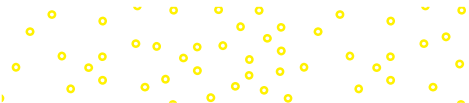
Test Builder allows you to:

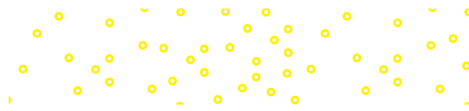
- access all test bank content from a particular title.
- easily pinpoint the most relevant content through robust filtering options.
- manipulate the order of questions or scramble questions and/or answers.
- pin questions to a specific location within a test.
- determine your preferred treatment of algorithmic questions.
- choose the layout and spacing.
- add instructions and configure default settings.

Test Builder provides a secure interface for better protection of content and allows for just-in-time updates to flow directly into assessments.

Writing Assignment

Available within Connect and Connect Master, the Writing Assignment tool delivers a learning experience to help students improve their written communication skills and conceptual understanding. As an instructor, you can assign, monitor, grade, and provide feedback on writing more efficiently and effectively.





Create



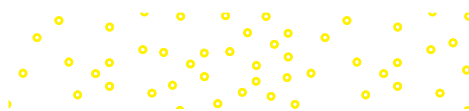
Your Book, Your Way

McGraw Hill's Content Collections Powered by Create[®] is a self-service website that enables instructors to create custom course materials—print and eBooks—by drawing upon McGraw Hill's comprehensive, cross-disciplinary content. Choose what you want from our high-quality textbooks, articles, and cases. Combine it with your own content quickly and easily, and tap into other rights-secured, third-party content such as readings, cases, and articles. Content can be arranged in a way that makes the most sense for your course, and you can include the course name and information as well. Choose the best format for your course: color print, black-and-white print, or eBook. The eBook can be included in your Connect course and is available on the free ReadAnywhere[®] app for smartphone or tablet access as well. When you are finished customizing, you will receive a free digital copy to review in just minutes! Visit McGraw Hill Create[®]—www.mcgrawhillcreate.com—today and begin building!

Reflecting the Diverse World Around Us

McGraw Hill believes in unlocking the potential of every learner at every stage of life. To accomplish that, we are dedicated to creating products that reflect, and are accessible to, all the diverse, global customers we serve. Within McGraw Hill, we foster a culture of belonging, and we work with partners who share our commitment to equity, inclusion, and diversity in all forms. In McGraw Hill Higher Education, this includes, but is not limited to, the following:

- Refreshing and implementing inclusive content guidelines around topics including generalizations and stereotypes, gender, abilities/disabilities, race/ethnicity, sexual orientation, diversity of names, and age.
- Enhancing best practices in assessment creation to eliminate cultural, cognitive, and affective bias.
- Maintaining and continually updating a robust photo library of diverse images that reflect our student populations.
- Including more diverse voices in the development and review of our content.
- Strengthening art guidelines to improve accessibility by ensuring meaningful text and images are distinguishable and perceivable by users with limited color vision and moderately low vision.



Acknowledgments

Our sincere thanks to all who helped us on this project. We also thank Katie Terrell for helping shape our vision for this book.

Our biggest thanks to the awesome team at McGraw Hill, including Rebecca Olson, Eric Weber, Steven Rigolosi, Katherine Ward, Harper Christopher, Kelsey Darin, and Jill Eccher.

We also thank Shane Lunceford from LendingClub for help us gain access to LendingClub data. We also acknowledge Bonnie Klamm, Mike Casey, and Edie Schmidt for help with accuracy checking.

In addition, we appreciate the contributions of the following reviewers, who provided ideas and insights for this new book.

Shikhar Acharya
Loras College

Guclu Atinc
Texas A& M University–Commerce

John H. Batchelor
University of West Florida

Palash Bera
Saint Louis University

Carol Cagle
Mercer University

Cenk Caliskan
Utah Valley University

Roberto Cavazos
University of Baltimore

Xiaohui Chang
Oregon State University

Jehanzeb Cheema
George Mason University

Julie Dilling
Moraine Park Technical College

Christie Fuller
Boise State University

Regina Gramling
Auburn University

Daryl D. Green
Oklahoma Baptist University

Bo Han
Texas A&M University–Commerce

Keith Harman
Oklahoma Baptist University

Faria Huq
Lake Erie College

Jaehwan Jeong
Radford University

Patrick Johanns
University of Iowa

Lauren Kleitz
Xavier University

Brian Kovar
Kansas State University

Jooh Lee
Rowan University

Anita Lee-Post
University of Kentucky

Vic Matta
Ohio University

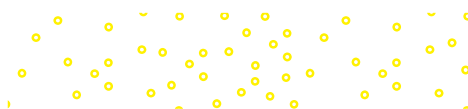
Jack McCann
Purdue University

Miriam McGaugh
Oklahoma State University

Reza Mousavi
Western Michigan University

Anita Mukherjee
University of Wisconsin–Madison

Hongsong Neuhauser
Elizabethtown College



Kristen Pettey
Southwestern College

Richard R. J. Podeschi
Millikin University

Roman Rabinovich
Boston University

Carole Shook
University of Arkansas

Mike Shurden
Lander University

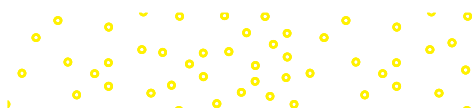
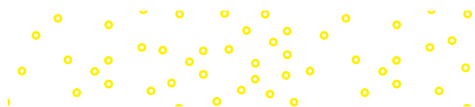
B. S. Vijayaraman
The University of Akron

Benjamin Williams
University of Denver

Emre Yetgin
Rider University

Amy J. N. Yurko
Duquesne University

Faye X. Zhu
Rowan University



Brief Table of Contents

About the Authors vii

From the Authors viii

Key Features x

Available in Connect xiii

Acknowledgments xix

Chapter 1	Specify the Question: Using Business Analytics to Address Business Questions	2
Chapter 2	Obtain the Data: An Introduction to Business Data Sources	68
Chapter 3	Analyze the Data: Basic Statistics and Tools Required in Business Analytics	134
Chapter 4	Analyze the Data: Exploratory Business Analytics (Descriptive and Diagnostic Analytics)	220
Chapter 5	Analyze the Data: Confirmatory Business Analytics (Predictive Analytics and Prescriptive Analytics)	272
Chapter 6	Report the Results: Using Data Visualization	336
Chapter 7	Marketing Analytics	438
Chapter 8	Accounting Analytics	540
Chapter 9	Financial Analytics	618
Chapter 10	Operations Analytics	686
Chapter 11	Advanced Business Analytics	774
Chapter 12	Using the SOAR Analytics Model to Put It All Together: Three Capstone Projects	844
Appendix A	Excel Tutorial (Formatting, Sorting, Filtering, and Pivot Tables)	860
Appendix B	Tableau Tutorial	868
Appendix C	Power BI Desktop Tutorial	872
Appendix D	Basic Statistics Tutorial	879
Appendix E	Installing Excel's Analysis ToolPak Add-In	883
Appendix F	Installing Excel's Solver Add-In	885

***GLOSSARY** G1

INDEX I1

*Indicates Connect only material

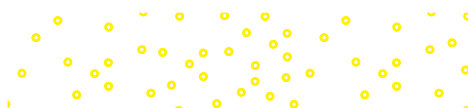


Table of Contents

Chapter 1

Specify the Question: Using Business Analytics to Address Business Questions 2

- 1.1 Businesses Create Value 3
 - The Increasing Availability of Data and the Role of Business Analyst* 4
 - 1.2 The Difference Between Data and Information 6
 - 1.3 Summarizing the Role of the Business Analyst 7
 - 1.4 Business Analytics Across the Different Business Functions 8
 - 1.5 An Introduction to the Soar Analytics Model 9
 - Illustration of the SOAR Analytics Model: Predicting Inventory Needs* 11
 - S: Specify the Question* 11
 - O: Obtain the Data* 12
 - A: Analyze the Data* 14
 - R: Report the Results* 16
 - 1.6 Using Exploratory and Explanatory Data Visualizations in Business Analytics 17
 - Exploratory Visualizations* 17
 - Explanatory Visualizations* 18
- Chapter Summary 21
- Key Terms 21
- Answers to Progress Checks 23
 - Multiple-Choice Questions 24
 - Discussion Questions 26
 - Problems 29
 - Lab 1.1** Excel: Assessing Profitability of a Mowing Business 32
 - Lab 1.2** Excel: Assessing Customer Profitability 39
 - Lab 1.2** Tableau: Assessing Customer Profitability 44
 - Lab 1.2** Power BI: Assessing Customer Profitability 49
 - Lab 1.3** Excel: Assessing Product (SKU) Profitability 52
 - Lab 1.3** Tableau: Assessing Product (SKU) Profitability 58
 - Lab 1.3** Power BI: Assessing Product (SKU) Profitability 64

Chapter 2

Obtain the Data: An Introduction to Business Data Sources 68

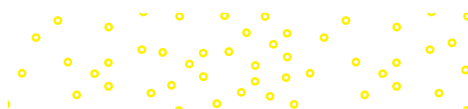
- 2.1 Internal and External Data Sources 70
 - Internal Data Sources* 70

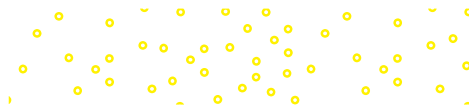
- External Data Sources* 72
- 2.2 Obtaining the Data 77
 - Text Data* 77
 - Tabular Data* 77
- 2.3 Structured Data Types: Categorical versus Numerical 78
 - Categorical Data: Nominal and Ordinal Data* 79
 - Numerical Data: Interval and Ratio Data* 81
 - Additional Ways to Classify Data* 83
- 2.4 Preparing Data for Analysis 84
 - Step 1: Ensure Data Quality* 84
 - Step 2: Validate the Data for Completeness and Integrity* 85
 - Step 3: Cleanse the Data* 86
 - Step 4: Perform Preliminary Exploratory Analysis* 89
- 2.5 Tools Used to Prepare Data for Analysis 90
- 2.6 Gathering and Protecting Data Ethically 91
- Chapter Summary 92
- Key Terms 93
- Answers to Progress Checks 95
- Multiple-Choice Questions 96
- Discussion Questions 98
- Problems 100
- Lab 2.1** Excel: Identifying and Working with Different Data Types 104
- Lab 2.2** Tableau: Preparing Different Data Types for Analysis 109
- Lab 2.2** Power BI: Preparing Different Data Types for Analysis 113
- Lab 2.3** Tableau: Conducting Preliminary Exploratory Analysis 117
- Lab 2.3** Power BI: Conducting Preliminary Exploratory Analysis 122
- Lab 2.4** Excel: Aggregating and Visualizing Different Data Types 127

Chapter 3

Analyze the Data: Basic Statistics and Tools Required in Business Analytics 134

- 3.1 Defining Populations and Samples 136
 - Parameters and Statistics* 136
 - Descriptive/Summary Statistics, Inferential Statistics, and Hypotheses* 137
- 3.2 Sampling Methods, Data Reduction, and Bias 137
 - Sampling Methods* 137





Lab 4.2 Excel: Using Conditional Formatting to Perform a Bank Reconciliation 258

Lab 4.3 Excel: Applying Benford's Law 262

Chapter 5

Analyze the Data: Confirmatory Business Analytics (Predictive Analytics and Prescriptive Analytics) 272

5.1 Confirmatory Data Analytics 274

5.2 Predictive Analytics 274

Classification 274

Regression 277

Time Series Analysis 279

5.3 Base Rates and Base Rate Fallacy 280

5.4 Prescriptive Analytics 281

Prescriptive Analytics Techniques 281

5.5 Summary of Analytics Performed to Address Business Questions 284

Summary 286

Key Terms 286

Answers to Progress Checks 287

Multiple-Choice Questions 287

Discussion Questions 289

Problems 290

Lab 5.1 Excel: Evaluating the Relationship Between Sales and R&D Expenditures 293

Lab 5.2 Excel: Evaluating the Relationship Between Sales and R&D Expenditures: Testing for a Nonlinear Relationship 299

Lab 5.3 Excel: Forecasting Product Demand Using Time Series Analysis 305

Lab 5.4 Tableau: Forecasting Product Demand Using Time Series Analysis 308

Lab 5.5 Power BI: Forecasting Product Demand Using Time Series Analysis 316

Lab 5.6 Excel: Forecasting Product Demand Using Regression 319

Lab 5.7 Excel: Assessing the Returns to Education: To MBA or Not to MBA? 324

Lab 5.8 Excel: Applying Scenario Analysis: Possible Trade War 331

Chapter 6

Report the Results: Using Data Visualization 336

6.1 The Basics of Data Visualization 338

Why Use Visualizations? 338

Sorting Considerations 340

6.2 Distinguishing Among Chart Types 342

Charts Appropriate for Categorical Data 343

Charts Appropriate for Numerical (Quantitative) Data 347

6.3 Visualizing Exploratory Business Analytics 348

Bar Charts, Line Charts, and Pie Charts 349

Bar Charts Versus Histograms 351

Visualizing Outliers and Anomalies 354

Pivot Tables 355

6.4 Visualizing Confirmatory Analytics 356

Correlation and Regression 357

Forecasting with Time Series Data 358

6.5 Presenting Data in a Dashboard 359

Checklist for Creating Effective Charts That Clearly Answer Business Questions 361

6.6 Communicating Your Data with Words:

Executive Summaries and Reports 362

Executive Summary 362

Full Report 363

Chapter Summary 365

Key Terms 365

Answers to Progress Checks 366

Multiple-Choice Questions 367

Discussion Questions 370

Problems 371

Lab 6.1 Excel: Descriptive Analytics: Visualizing Pivot Table Data Using Conditional Formatting and Sparklines 377

Lab 6.2 Tableau: Descriptive Analytics: Analyzing Sales Revenue by Product with a Tree Map 384

Lab 6.2 Power BI: Descriptive Analytics: Analyzing Sales Revenue by Product with a Tree Map 391

Lab 6.3 Tableau: Descriptive Analytics: Analyzing Sales Revenue by Customer with a Bar Chart and Filters 397

Lab 6.3 Power BI: Descriptive Analytics: Analyzing Sales Revenue by Customer with a Bar Chart and Filters 405

Lab 6.4 Excel: Descriptive Analytics: Creating a Dashboard Using Pivot Tables and Slicers 413

Lab 6.5 Tableau: Descriptive Analytics: Creating a Dashboard 421

Lab 6.5 Power BI: Descriptive Analytics: Creating a Dashboard 430

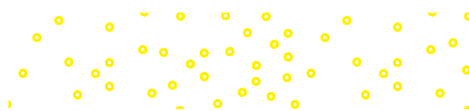
Chapter 7

Marketing Analytics 438

7.1 What Is Marketing? 440

The Marketing Mix 440

7.2 Specifying The Marketing Question 441



7.3 Obtain The Data: What Marketing Data Are Available? A Discussion of Marketing Data Sources 443

Internal Marketing Data 443

External Marketing Data 446

Combining Internal and External Data 449

7.4 Descriptive Marketing Analytics 451

Statistical, Summarization, and Data Visualization

Techniques for Descriptive Analytics 451

Examples of Marketing Descriptive Analytics 451

7.5 Diagnostic Marketing Analytics 456

Identification of Anomalies and Outliers 456

Cluster Analysis 458

Correlation and Summarization 459

7.6 Predictive Marketing Analytics 462

Decision Tree 463

7.7 Prescriptive Marketing Analytics 464

Goal-Seek Analysis 465

7.8 Report The Results 468

Chapter Summary 469

Key Terms 470

Answers to Progress Checks 471

Multiple-Choice Questions 473

Discussion Questions 475

Problems 478

Lab 7.1 Excel: Descriptive Analytics: Analyzing Company Historical Performance 482

Lab 7.2 Excel: Descriptive Analytics: Using a Pivot Table to Analyze Historical Performance by Product Size and Year 490

Lab 7.3 Tableau: Descriptive Analytics: Using a Histogram to Evaluate Process Time 497

Lab 7.3 Power BI: Descriptive Analytics: Using a Histogram to Evaluate Process Time 502

Lab 7.4 Excel Diagnostic Analytics: Analyzing the Steps in the Sales Process with a Sales Funnel Chart 507

Lab 7.5 Tableau: Diagnostic Analytics: Examining Pricing Strategy with Cluster Analysis 514

Lab 7.6 Excel: Predictive Analytics: Predicting Sales Revenue from Advertising Expense 520

Lab 7.6 Tableau: Predictive Analytics: Predicting Sales Revenue from Advertising Expense 525

Lab 7.7 Excel: Prescriptive Analytics: Calculating Internet CPM Rate Using Goal Seek 530

Lab 7.8 Excel: Prescriptive Analytics: Calculating Product Price Using Goal Seek 534

Chapter 8

Accounting Analytics 540

8.1 The Role of Accounting in Business 542

The Four Primary Branches of Accounting 542

8.2 Specifying the Accounting Question 543

8.3 Obtain the Data: The Sources of Accounting Data 545

Financial Accounting Data Sources 545

Managerial Accounting Data Sources 548

Auditing Data Sources 551

Tax Data Sources 551

8.4 Descriptive Accounting Analytics 552

8.5 Diagnostic Accounting Analytics 556

Identifying Anomalies and Outliers 556

Performing Drill-Down Analysis to Determine Relations, Patterns, and Linkages Among Variables 559

8.6 Predictive Accounting Analytics 561

Using Time Series Analysis to Predict Sales 561

8.7 Prescriptive Accounting Analytics 562

Goal-Seek Analysis 563

Sensitivity Analysis 564

8.8 Report The Results 565

Tables Are Sometimes a More Effective Way to Show Results 565

Using Visualizations to Highlight Anomalies 566

Using a Graph to Show Break-Even Sales 567

Summary 567

Key Terms 568

Answers to Progress Checks 569

Multiple-Choice Questions 570

Discussion Questions 571

Problems 574

Lab 8.1 Excel: Descriptive Analytics: Performing Horizontal Analysis 577

Lab 8.2 Excel: Descriptive Analytics: Performing Vertical Analysis 582

Lab 8.3 Excel: Diagnostic Analytics: Using Fuzzy Matching to Look for Fraud 586

Lab 8.4 Excel: Diagnostic Analytics: Estimating Fixed and Variable Costs 592

Lab 8.5 Excel: Predictive Analytics: Forecasting Future Performance of IBM 598

Lab 8.6 Tableau: Predictive Analytics: Forecasting Future Performance of IBM 602

Lab 8.7 Power BI: Predictive Analytics: Forecasting Future Performance of IBM 611

Lab 8.8 Excel: Prescriptive Analytics: Using Goal-Seek Analysis to Determine the Break-Even Point 614

Chapter 9

Financial Analytics 618

- 9.1 The Role of Finance in Business 620
The Three Primary Branches of Finance 620
- 9.2 Specifying the Finance Question 621
- 9.3 Obtain the Data: Financial Data Sources 622
Stock-Return Data 622
Summarized Financial Data 623
Financial Statement Data 623
- 9.4 Descriptive Financial Analytics 625
Statistical and Summarization Techniques for Descriptive Analytics 625
Descriptive Statistics 626
- 9.5 Diagnostic Financial Analytics 627
Finding Anomalies and Outliers 627
Drill-Down Analytics Using DuPont Ratios 627
Abbreviated DuPont Ratio Analysis for Return on Assets 629
Risk/Return and the Sharpe Ratio 631
Risk/Return Diagnostic Analysis Using the Sharpe Ratio 632
Risk/Return Diagnostic Analysis Using Regression Analysis 632
- 9.6 Predictive Financial Analytics 633
Altman's Z and Bankruptcy Classification 634
Predicting Who Will Be Offered a Loan 635
- 9.7 Prescriptive Financial Analytics 638
Prescriptive Cash Flow Analysis 639
Sensitivity Analysis 644
- 9.8 Report The Results 645
Line Graphs to Compare Performance 645
Research Reports and Earnings Forecasts 645
Line Graphs in Sensitivity Analysis 647
- Summary 647
 Key Terms 648
 Answers to Progress Checks 649
 Multiple-Choice Questions 650
 Discussion Questions 652
 Problems 654
- Lab 9.1** Excel: Descriptive and Diagnostic Analytics: Calculating Returns to Investments Using the Sharpe Ratio 659
- Lab 9.2** Excel: Diagnostic Analytics: Applying DuPont Analysis of Financial Performance 664

Lab 9.3 Excel: Predictive Analytics: Evaluating Loan Acceptance 667

Lab 9.4 Excel: Predictive Analytics: Predicting Bankruptcy 671

Lab 9.5 Excel: Prescriptive Analytics: Evaluating Investments Using NPV 678

Lab 9.6 Excel: Prescriptive Analytics: Evaluating Investments Using IRR 682

Chapter 10

Operations Analytics 686

- 10.1 The Role of Operations in Business 688
The Three Primary Branches of Operations 688
- 10.2 Specifying the Operations Question 690
- 10.3 Obtain the Data: Operations Data Sources 692
Human Resources Data 692
IT Operations Data 694
Supply Chain Data 695
- 10.4 Descriptive Operations Analytics 697
Statistical, Summarization, and Data Visualization Techniques 697
- 10.5 Diagnostic Operations Analytics 702
- 10.6 Predictive Operations Analytics 707
- 10.7 Prescriptive Operations Analytics 710
Optimization 711
- 10.8 Report The Results 714
- Chapter Summary 716
 Key Terms 716
 Answers to Progress Checks 717
 Multiple-Choice Questions 719
 Discussion Questions 721
 Problems 723
- Lab 10.1** Excel: Descriptive Analytics/Supply Chain: Calculating KPIs for Walmart and Amazon 728
- Lab 10.2** Tableau: Descriptive Analytics/Human Resources: Analyzing Employee Turnover Using a Bar Chart 734
- Lab 10.2** Power BI: Descriptive Analytics/Human Resources: Analyzing Employee Turnover Using a Bar Chart 739
- Lab 10.3** Excel: Diagnostic Analytics/Supply Chain: Analyzing KPI Differences Between Walmart and Amazon 745
- Lab 10.4** Tableau: Diagnostic Analytics/IT Operations: Analyzing Website Response Time Using a Control Chart 750

- Lab 10.5** Tableau: Predictive Analytics/Supply Chain: Forecasting Unit Demand 758
- Lab 10.6** Excel: Prescriptive Analytics/Human Resources: Optimizing Employee Assignment 768

Chapter 11

Advanced Business Analytics 774

- 11.1 Adaptive/Autonomous Business Analytics 776
Adaptive/Autonomous Analytics: Mimicking Human Capabilities 777
- 11.2 Advanced Analytic Methods 780
Artificial Intelligence 780
- 11.3 Adaptive/Autonomous Analytics in the Business Functions 783
Marketing Analytics 784
Accounting Analytics 786
Financial Analytics 789
Operations Analytics 791
- 11.4 Trending Technologies 798
Robotic Process Automation (RPA) 799
Cockpits 800
Voice and Image Analytics 800
Blockchain Analytics 801
- 11.5 Data-Driven Organizations and the Future of Business Analytics 805
Limitations of Business Analytics 806
The Future of Business Analytics 806
- Summary 807
- Key Terms 808
Answers to Progress Checks 809
- Multiple-Choice Questions 810
- Discussion Questions 812
- Problems 814
- Lab 11.1** Excel: Advanced Analytics/Marketing: Analyzing Customer Repurchase Rates Using Cohorts 821
- Lab 11.2** Tableau: Advanced Analytics/Marketing: Analyzing Text Using a Word Cloud 828
- Lab 11.3** Excel: Advanced Analytics/Human Resources: Visualizing Survival Analysis 831
- Lab 11.4** Excel: Advanced Analytics/Supply Chain: Estimating Demand Using Monte Carlo Simulation 836
- Lab 11.5:** Advanced Analytics: Understanding Blockchain 840

Chapter 12

Using the SOAR Analytics Model to Put It All Together

Three Capstone Projects 844

- 12.1 Project 1: Determining the Price of Airbnb Nightly Rentals in New York City 846
Specify the Question 847
Obtain the Data 847
Analyze the Data 850
Report the Results 851
- 12.2 Project 2: Determining the Factors Associated With Loan Repayment 851
Specify the Question 851
Obtain the Data 851
Analyze the Data 853
Report the Results 855
- 12.3 Project 3: Completing your own Project Using the Soar Analytics Model 855
Using the SOAR Analytics Model 855
Deliverables 856

Appendix A

Excel Tutorial (Formatting, Sorting, Filtering, and Pivot Tables) 860

Appendix B

Tableau Tutorial 868

Appendix C

Power BI Desktop Tutorial 872

Appendix D

Basic Statistics Tutorial 879

Appendix E

Installing Excel's Analysis ToolPak Add-In 883

Appendix F

Installing Excel's Solver Add-In 885

*GLOSSARY Online G1

INDEX I1

*Indicates Connect only material