business statistics

DeMYSTiFieD

A SELF-TEACHING GUIDE

- Learn to PRESENT statistics EFFECTIVELY through simple graphs
- UNDERSTAND and prepare statistical REPORTS
- Make business DECISIONS using statistical STUDIES
- Well-illustrated TECHNIQUES using real-world BUSINESS examples
- Complete with chapter-ending QUIZZES and final EXAMS

Steven M. Kemp, Ph.D.
Sid Kemp

Mc Graw Hill

BUSINESS STATISTICS DEMYSTIFIED

GIFT OF THE ASIA FOUNDATION
NOT FOR RE-SALE
QUÀ TẶNG CỦA QUỸ CHÂU Á
KHÔNG ĐƯỢC BÁN LẠI

STEVEN M. KEMP, Ph.D
SID KEMP, PMP

TRƯỜNG ĐẠI HỌC CÔNG NGHIỆP HÀ NỘI
TRUNG TÂM THÔNG TIN THƯ VIỆN
07-07
01100

McGRAW-HILL
New York Chicago San Francisco Lisbon London
Madrid Mexico City Milan New Delhi San Juan
Seoul Singapore Sydney Toronto

The McGraw-Hill Companies

Cataloging-in-Publication Data is on file with the Library of Congress

To Our Mom

Figure 7-16. Copyright © 1995–2004, The Weather Channel Interactive, Inc.

Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher.

3 4 5 6 7 8 9 0 DOC/DOC 0 9 8 7 6 5

ISBN 0-07-144024-0

The sponsoring editor for this book was Judy Bass and the production supervisor was Pamela Pelton. The art director for the cover was Margaret Webster-Shapiro. It was set in Times Roman by Keyword Publishing Services Ltd.

Printed and bound by RR Donnelley.

This book was printed on recycled, acid-free paper containing a minimum of 50% recycled, de-inked fiber.

McGraw-Hill books are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. For more information, please write to the Director of Special Sales, McGraw-Hill Professional, Two Penn Plaza, New York, NY 10121-2298. Or contact your local bookstore.

Information in this book has been obtained by The McGraw-Hill Companies, Inc. ("McGraw-Hill") from sources believed to be reliable. However, neither the publisher nor the authors guarantee the accuracy or completeness of any information published herein and neither McGraw-Hill nor its authors shall be responsible for any errors, omissions, or damages arising out of use of this information. This work is published with the understanding that McGraw-Hill and its authors are supplying information but are not attempting to render engineering or other professional services. If such services are required, the assistance of an appropriate professional should be sought.

CONTENTS

	Preface	**xi**
	Acknowledgments	**xv**
PART ONE	**What Is Business Statistics?**	**1**
CHAPTER 1	**Statistics for Business**	**7**
	Doing Without Statistics	7
	Statistics are Cheap	8
	Lying with Statistics	9
	So Many Choices, So Little Time	10
	Math and Mystery	11
	Where Is Statistics Used?	12
	The Statistical Study	16
	The Statistical Report	17
	Quiz	17
CHAPTER 2	**What Is Statistics?**	**20**
	Measurement	21
	Error	30
	Sampling	36
	Analysis	42
	Quiz	45

CHAPTER 3 **What Is Probability?** 47
How Probability Fits in With Statistics 48
Measuring Likelihoods 48
Three Types of Probability 52
Using Probability for Statistics 62
The Laws of Probability 83
Quiz 84

Exam for Part One 87

PART TWO **Preparing a Statistical Report** 93

CHAPTER 4 **What Is a Statistical Study?** 95
Why Do a Study? 97
Why Use Statistics? 97
What Are the Key Steps in a Statistical Study? 99
Planning a Study 101
What Are Data and Why Do We Need Them? 102
Gathering Data: Where and How to Get Data 104
Writing a Statistical Report for Business 107
Reading a Statistical Report 107
Quiz 109

CHAPTER 5 **Planning a Statistical Study** 111
Determining Plan Objectives 113
Defining the Research Questions 113
Assessing the Practicality of the Study 116
Preparing the Data Collection Plan 116
Planning Data Analysis 118
Planning the Preparation of the Statistical Report 119
Writing Up the Plan 120
Quiz 123

CHAPTER 6 **Getting the Data** **125**
Stealing Statistics: Pros and Cons 125
Someone Else's Data: Pros and Cons 127
Doing it Yourself: Pros and Cons 129
Survey Data 132
Experimental and Quasi-Experimental Data 137
Quiz 138

CHAPTER 7 **Statistics Without Numbers: Graphs and Charts** **140**
When to Use Pictures: Clarity and Precision 141
Parts is Parts: The Pie Chart 142
Compare and Contrast: The Bar Chart 144
Change: The Line Graph 152
Comparing Two Variables: The Scatter Plot 154
Don't Get Stuck in a Rut: Other Types of Figures 156
Do's and Don'ts: Best Practices in Statistical Graphics 160
Quiz 171

CHAPTER 8 **Common Statistical Measures** **173**
Fundamental Measures 174
Descriptive Statistics: Characterizing Distributions 179
Measuring Measurement 195
Quiz 205

CHAPTER 9 **A Difference That Makes a Difference. When Do Statistics Mean Something?** **208**
The Scientific Approach 209

	Hypothesis Testing	212
	Statistical Significance In Business	227
	Quiz	236
CHAPTER 10	**Reporting the Results**	**238**
	Three Contexts for Decision Support	238
	Good Reports and Presentations	239
	Reports and Presentations Before the Decision	244
	Reports and Presentations After the Decision	245
	Advertisements and Sales Tools Using Statistics	246
	Quiz	247
	Exam for Part Two	**249**
PART THREE	**Statistical Inference: Basic Procedures**	**255**
CHAPTER 11	**Estimation: Summarizing Data About One Variable**	**257**
	Basic Principles of Estimation	258
	Single-Sample Inferences: Using Estimates to Make Inferences	262
CHAPTER 12	**Correlation and Regression**	**267**
	Relations Between Variables	268
	Regression Analysis: The Measured and the Unmeasured	273
	Multiple Regression	281
CHAPTER 13	**Group Differences: Analysis of Variance (ANOVA) and Designed Experiments**	**285**
	Making Sense of Experiments With Groups	286
	Group Tests	289
	Fun With ANOVA	295

CHAPTER 14	**Nonparametric Statistics**	**298**
	Problems With Populations	298
	A Solution: Sturdy Statistics	299
	Popular Nonparametric Tests	301
	Exam for Part Three	**312**
PART FOUR	**Making Business Decisions**	**317**
CHAPTER 15	**Creating Surveys**	**319**
	Planning and Design	319
	Conducting the Survey	324
	Interpreting and Reporting the Results	325
	Quiz	325
CHAPTER 16	**Forecasting**	**327**
	The Future Is Good To Know	328
	The Measurement Model	329
	Descriptive Statistics	335
	Inferential Statistics	337
	Cautions About Forecasting	340
	Quiz	344
CHAPTER 17	**Quality Management**	**346**
	Key Quality Concepts	346
	Root Cause Analysis	348
	Statistical Process Control	353
	Quiz	358
APPENDIX A	**Basic Math for Statistics**	**361**
APPENDIX B	**Answers to Quizzes and Exams**	**364**
APPENDIX C	**Resources for Learning**	**366**
	Index	**369**