

# **Statistics**

Informed Decisions Using Data

FIFTH EDITION

Michael Sullivan



<b>Putting It Together Sections</b>	it Together  Objective		Page(s
	Objective		
5.6 Putting It Together: Which Method Do I Use?	<ol> <li>Determine the appropriate probability rule to use</li> <li>Determine the appropriate counting technique to use</li> </ol>		
9.5 Putting It Together: Which Method Do I Use?	Determine the appropriate confidence interval to construct		
10.6 Putting It Together: Which Method Do I Use?	① Determine the appropriate hypothesis test to perform (one sample)		
11.5 Putting It Together: Which Method Do I Use?	① Determine the appropriate hypothesis test to perform (two samples)		
Putting It Together Exercises	Skills Utilized	Section(s) Covered	Page(s
1.2.24 Passive Smoke	Variables, observational studies, designed experiments	1.1, 1.2	49
1.4.37 Comparing Sampling Methods	Simple random sampling and other sampling techniques	1.3, 1.4	64
1.4.38 Thinking about Randomness	Random sampling	1.3, 1.4	64
2.1.29 Online Homework	Variables, designed experiments, bar graphs	1.1, 1.2, 1.6, 2.1	103
2.2.47 Time Viewing a Webpage	Graphing data	2.2	121
2.2.48 Which Graphical Summary?	Choosing the best graphical summary	2.1, 2.2	121
2.3.19 Rates of Return on Stocks	Relative frequency distributions, relative frequency histograms, relative frequency polygons, ogives	2.2, 2.3	128
2.3.20 Shark!	Graphing data	2.3	128
3.1.41 Shape, Mean, and Median	Discrete vs. continuous data, histograms, shape of a distribution, mean, median, mode, bias	1.1, 1.4, 2.2, 3.1	158
3.5.17 Earthquakes	Mean, median, range, standard deviation, relative frequency histogram, boxplots, outliers	2.2, 3.1, 3.2, 3.4, 3.5	199
3.5.18 Paternal Smoking	Observational studies, designed experiments, lurking variables, mean, median, standard deviation, quartiles, boxplots	1.2, 1.6, 3.1, 3.2, 3.4, 3.5	199–200
4.2.29 Housing Prices	Scatter diagrams, correlation, linear regression	4.1, 4.2	237
4.2.30 Smoking and Birth Weight	Observational study vs. designed experiment, prospective studies, scatter diagrams, linear regression, correlation vs. causation, lurking variables	1.2, 4.1, 4.2	237–238
4.3.31 A Tornado Model	Explanatory and response variables, scatter diagrams, correlation, least-square regression, interpret slope, coefficient of determination, residual plots, residual analysis	4.1, 4.2, 4.3	252
4.3.32 Exam Scores	Building a linear model	4.1, 4.2, 4.3	252
5.1.54 Drug Side Effects	Variables, graphical summaries of data, experiments, probability	1.1, 1.6, 2.1, 5.1	289
5.2.44 Speeding Tickets	Contingency tables, marginal distributions, empirical probabilities	4.4, 5.1	300
5.2.45 Red Light Cameras	Variables, relative frequency distributions, bar graphs, mean, standard deviation, probability, Simpson's Paradox	1.1, 2.1, 3.1, 3.2, 4.4, 5.1, 5.2	300–301
6.1.35 Sullivan Statistics Survey I	Mean, standard deviation, probability, probability distributions	3.1, 3.2, 5.1, 6.1	355
6.2.55 Beating the Stock Market	Expected value, binomial probabilities	6.1, 6.2	370
7.2.52 Birth Weights	Relative frequency distribution, histograms, mean and standard deviation from grouped data, normal probabilities	2.1, 2.2, 3.3, 7.2	405
7.3.13 Demon Roller Coaster	Histograms, distribution shape, normal probability plots	2.2, 7.3	410
8.1.33 Playing Roulette	Probability distributions, mean and standard deviation of a random variable, sampling distributions	6.1, 8.1	434–435
9.1.47 Hand Washing	Observational studies, bias, confidence intervals	1.2, 1.5, 9.1	462
9.2.49 Smoking Cessation Study	Experimental design, confidence intervals	1.6, 9.1, 9.2	476
10.2.38 Lupus	Observational studies, retrospective vs. prospective studies, bar graphs, confidence intervals, hypothesis testing	1.2, 2.1, 9.1, 10.2	521
10.2.39 Naughty or Nice?	Experimental design, determining null and alternative hypotheses, binomial probabilities, interpreting <i>P</i> -values	1.6, 6.2, 10.1, 10.2	521

## Statistics: Informed Decisions Using Data, Global Edition

### **Table of Contents**

C	റ	V	e	r
$\mathbf{\sim}$	v	v	v	

Title Page

Copyright Page

Contents

Preface to the Instructor

Resources for Success

**Applications Index** 

### Part 1: Getting the Information You Need

#### Chapter 1: Data Collection

- 1.1 Introduction to the Practice of Statistics
- 1.2 Observational Studies versus Designed Experiments
- 1.3 Simple Random Sampling
- 1.4 Other Effective Sampling Methods
- 1.5 Bias in Sampling
- 1.6 The Design of Experiments

Chapter 1 Review

**Chapter Test** 

Making an Informed Decision: What College Should I Attend?

Case Study: Chrysalises for Cash

### Part 2: Descriptive Statistics

### Chapter 2: Organizing and Summarizing Data

- 2.1 Organizing Qualitative Data
- 2.2 Organizing Quantitative Data: The Popular Displays
- 2.3 Additional Displays of Quantitative Data
- 2.4 Graphical Misrepresentations of Data

Chapter 2 Review

**Chapter Test** 

Making an Informed Decision: Tables or Graphs?

Case Study: The Day the Sky Roared

### Chapter 3: Numerically Summarizing Data

- 3.1 Measures of Central Tendency
- 3.2 Measures of Dispersion
- 3.3 Measures of Central Tendency and Dispersion from Grouped Data
- 3.4 Measures of Position and Outliers
- 3.5 The Five-Number Summary and Boxplots



Chapter 3 Review

**Chapter Test** 

Making an Informed Decision: What Car Should I Buy?

Case Study: Who Was A Mourner?

#### Chapter 4: Describing the Relation between Two Variables

4.1 Scatter Diagrams and Correlation

4.2 Least-Squares Regression

4.3 Diagnostics on the Least-Squares Regression Line

4.4 Contingency Tables and Association

Chapter 4 Review

**Chapter Test** 

Making an Informed Decision: Relationships among Variables on a World Scale

Case Study: Thomas Malthus, Population, and Subsistence

4.5 Nonlinear Regression: Transformations (online)

### Part 3: Probability and Probability Distributions

### Chapter 5: Probability

5.1 Probability Rules

5.2 The Addition Rule and Complements

5.3 Independence and the Multiplication Rule

5.4 Conditional Probability and the General Multiplication Rule

5.5 Counting Techniques

5.6 Putting It Together: Which Method Do I Use?

Chapter 5 Review

**Chapter Test** 

Making an Informed Decision: The Effects of Drinking and Driving

Case Study: The Case of the Body in the Bag

5.7 Bayess Rule (online)

#### Chapter 6: Discrete Probability Distributions

6.1 Discrete Random Variables

6.2 The Binomial Probability Distribution

6.3 The Poisson Probability Distribution

Chapter 6 Review

**Chapter Test** 

Making an Informed Decision: Should We Convict?

Case Study: The Voyage of the St. Andrew

6.4 The Hypergeometric Probability Distribution (online)

#### Chapter 7: The Normal Probability Distribution

7.1 Properties of the Normal Distribution

7.2 Applications of the Normal Distribution

7.3 Assessing Normality

7.4 The Normal Approximation to the Binomial Probability Distribution



Chapter 7 Review

**Chapter Test** 

Making an Informed Decision: Stock Picking

Case Study: A Tale of Blood Chemistry

### Part 4: Inference: From Samples to Population

### Chapter 8: Sampling Distributions

8.1 Distribution of the Sample Mean

8.2 Distribution of the Sample Proportion

Chapter 8 Review

**Chapter Test** 

Making an Informed Decision: How Much Time Do You Spend in a Day ?

Case Study: Sampling Distribution of the Median

### Chapter 9: Estimating the Value of a Parameter

9.1 Estimating a Population Proportion

9.2 Estimating a Population Mean

9.3 Estimating a Population Standard Deviation

9.4 Putting It Together: Which Procedure Do I Use?

9.5 Estimating with Bootstrapping

Chapter 9 Review

**Chapter Test** 

Making an Informed Decision: How Much Should I Spend for this House?

Case Study: Fire-Safe Cigarettes

### Chapter 10: Hypothesis Tests Regarding a Parameter

10.1 The Language of Hypothesis Testing

10.2 Hypothesis Tests for a Population Proportion

10.3 Hypothesis Tests for a Population Mean

10.4 Hypothesis Tests for a Population Standard Deviation

10.5 Putting It Together: Which Method Do I Use?

10.6 The Probability of a Type II Error and the Power of the Test

Chapter 10 Review

Chapter Test

Making an Informed Decision: Selecting a Mutual Fund

Case Study: How Old Is Stonehenge?

#### Chapter 11: Inferences on Two Samples

11.1 Inference about Two Population Proportions

11.2 Inference about Two Means: Dependent Samples

11.3 Inference about Two Means: Independent Samples

11.4 Inference about Two Population Standard Deviations

11.5 Putting It Together: Which Method Do I Use?

Chapter 11 Review

**Chapter Test** 



Making an Informed Decision: Which Car Should I Buy? Case Study: Control in the Design of an Experiment

### Chapter 12: Inference on Categorical Data

12.1 Goodness-of-Fit Test

12.2 Tests for Independence and the Homogeneity of Proportions

12.3 Inference about Two Population Proportions: Dependent Samples

Chapter 12 Review

**Chapter Test** 

Making an Informed Decision: Benefits of College

Case Study: Feeling Lucky? Well, Are You?

#### Chapter 13: Comparing Three or More Means

13.1 Comparing Three or More Means (One-Way Analysis of Variance)

13.2 Post Hoc Tests on One-Way Analysis of Variance

13.3 The Randomized Complete Block Design

13.4 Two-Way Analysis of Variance

Chapter 13 Review

**Chapter Test** 

Making an Informed Decision: Where Should I Invest?

Case Study: Hat Size and Intelligence

### Chapter 14: Inference on the Least-Squares Regression Model and Multiple Regression

14.1 Testing the Significance of the Least-Squares Regression Model

14.2 Confidence and Prediction Intervals

14.3 Introduction to Multiple Regression

14.4 Interaction and Dummy Variables

14.5 Polynomial Regression

14.6 Building a Regression Model

Chapter 14 Review

**Chapter Test** 

Making an Informed Decision: Buying a Home

Case Study: Housing Boom

#### Chapter 15: Nonparametric Statistics

15.1 An Overview of Nonparametric Statistics

15.2 Runs Test for Randomness

15.3 Inference about Measures of Central Tendency

15.4 Inference about the Difference between Two Medians: Dependent Samples

15.5 Inference about the Difference between Two Medians: Independent Samples

15.6 Spearmans Rank-Correlation Test

15.7 KruskalWallis Test

Chapter 15 Review

**Chapter Test** 

Making an Informed Decision: Where Should I Live?



Case Study: Evaluating Alabamas 1891 House Bill 504

Photo Credits

Appendix A: Tables Appendix B: Lines

Answers

Index

