

Contents

1 Data and Statistics	1
Key Concepts	2
Discussion	3
Common Pitfalls	5
Final Thoughts and Activities	6
Practice Problems	6
Discussion Boards	6
Group Activity	6
Parting Thought	7
Problem Solutions	7
2 Introduction to Excel and Basic Charts	11
Key Concepts	11
Discussion	11
Basic Concepts	12
Bar and Column Charts	25
Pie Charts	27
Line Charts and Area Charts	30
Other Charts	32
PivotTables (Aka Crosstabs)	37
Excel	42
Common Pitfalls	42
Final Thoughts and Activities	42
Practice Problems	42
Discussion Boards	43
Group Activity	43
Parting Thought	43
Problem Solutions	43

3 Summarizing Data: Descriptive Statistics and Histograms	47
Key Concepts	47
Discussion	47
Symbols	50
The Histogram	50
Excel	50
Descriptive Statistics	50
Histograms	57
Common Pitfalls	72
Final Thoughts and Activities	75
Practice Problems	75
Discussion Boards	76
Group Activity	76
Parting Thought	76
Problem Solutions	77
4 Normal Distributions	79
Key Concepts	79
Discussion	79
Excel	82
Common Pitfalls	113
Final Thoughts and Activities	113
Practice Problems	113
Discussion Boards	113
Group Activity	114
Parting Thought	114
Problem Solutions	114
5 Survey Design	117
Key Concepts	119
Discussion	120
Basic Concepts	120
Survey Design	120
Scale	121
Types of Questions	123
Data	127
Coding	130
Errors in Survey Question Creation	131
Errors in Survey Data Collection	133
Checklist	135
Excel	135
Final Thoughts and Activities	139
Practice Problems and Case Studies	139
Discussion Boards	140
Group Activity	140
Parting Thought	140
Problem Solutions	141

6 Sampling	143
Key Concepts	145
Discussion	146
Types of Problems	148
Excel	150
Problem Type: Infinite Mean	150
Practice Problem for Infinite Mean	152
Problem Type: Infinite Proportion	153
Practice Problem for Infinite Proportion	155
Finite Population Correction Factor (fpc)	156
Final Thoughts and Activities	157
Practice Problems	157
Discussion Boards	157
Group Activity	157
Parting Thought	158
Problem Solutions	158
7 Inference	161
Key Concepts	161
Discussion	161
Inferring Proportions	165
Example Problem	165
Excel	165
Inferring Averages	169
Example Problem	169
Excel	169
Confidence Intervals with Proportion Inference	171
Example Problem	171
Excel	171
Final Thoughts and Activities	178
Practice Problems and Case Studies	178
Discussion Boards	178
Group Activity	179
Parting Thought	179
Problem Solutions	179
8 Probability	183
Key Concepts	183
Discussion	183
Example 1	186
Example 2	187
Excel	189
Finding Probabilities Using Normal Distributions	189
Calculating Combinations and Permutations	195
Finding Probabilities Using the Binomial Distribution	199
Common Excel Pitfalls	201

Final Thoughts and Activities	202
Practice Problems	202
Discussion Boards	202
Group Activity	203
Parting Thought	203
Problem Solutions	203
9 Correlation	205
Key Concepts	205
Discussion	205
Nonlinear data caution	209
Average data caution	210
Excel	210
Correlation: One r Value or Correlation Matrix	210
Common Excel Pitfalls	215
Final Thoughts and Activities	215
Practice Problems	215
Discussion Boards	216
Group Activity	216
Parting Thought	217
Problem Solutions	217
10 Simple Linear Regression	221
Key Concepts	221
Discussion	221
Residuals and Tests for Linearity	226
Standardized Residuals and Outliers	228
Excel	229
Scatterplot: Compute the Regression Line and the Coefficient of Determination	230
Regression Function: Compute the Regression Model	234
Compute Residual Plots Using the Regression Function	236
Using Excel's Regression Tool to Test for Normality of the Distribution of Residuals	238
Using Excel's Regression Tool to Test for Constant Variance of Residuals	239
Summary of Regression Analysis Process	241
Common Excel Pitfalls	242
Final Thoughts and Activities	242
Practice Problems	242
Discussion Boards	243
Group Activities	243
Parting Thought	244
Problem Solutions	244

11 Significance Tests Part 1	249
Key Concepts	249
Discussion	249
Basic Concepts	250
Significance Tests	257
F-test	258
t-Test	283
Common Excel Pitfalls	302
Final Thoughts and Activities	302
Practice Problems and Case Studies	302
Discussion Boards	303
Group Activity	303
Parting Thought	303
Problem Solutions	304
12 Significance Tests Part 2	309
Key Concepts	309
Discussion	309
Significance Tests	309
χ^2 Test	310
z-Test	321
Common Excel Pitfalls	343
Final Thoughts and Activities	343
Practice Problems and Case Studies	343
Discussion Boards	345
Group Activity	345
Parting Thought	345
Problem Solutions	345
13 Multiple Regression	355
Key Concepts	355
Discussion	355
Excel	358
Step 1: Fit the Model with Selected Independent Variables	358
Step 2: Does Multicollinearity Exist? Run a Correlation Matrix	358
Step 3: Run Regression Model	361
Step 4: Are the Assumptions of Regression Satisfied?	363
Step 5: Test Overall Model Significance (F-Test)	364
Step 6: Check p-Values for Independent Variables Meet Significance Criteria (t-Test)	364
Step 7: Run Model for Prediction and Estimation	364
Run Regression Model	365
Final Thoughts and Activities	366
Practice Problems	366
Discussion Boards	367
Parting Thought	367
Problem Solutions	367

14 Non-linear Regression	371
Key Concepts	371
Discussion	371
Power	371
Polynomial	372
Exponential	373
Logarithmic	374
Excel	375
Create the Trendline Graphs	376
Using the Non-linear Regression Trendline for Prediction	381
Common Excel Pitfalls	384
Final Thoughts and Activities	385
Practice Problems and Case Studies	385
Discussion Boards	386
Group Activity	386
Parting Thought	387
Problem Solutions	387
15 Survey Reports	391
Key Concepts	394
Discussion	395
Useful Hints and Phrases for the Report	400
Effective PowerPoint Presentations with Excel	400
Executive Summary	401
Methodology	402
Sampling Plan and Survey Creation	402
Results	403
Conclusions and Recommendations	407
Final Thoughts and Activities	408
Practice Problems and Case Studies	408
Discussion Boards	410
Group Activity	410
Parting Thought	410
Problem Solutions	410
Executive Summary	411
Background and Objectives	411
Research Methodology	412
Overview of Results	412
Conclusions and Recommendations	413
Bibliography	414
Appendix 1	414
Index	415