

# Contents

<b>1</b>	<b>Introduction to Spreadsheet Modeling</b> . . . . .	<b>1</b>
1.1	Introduction . . . . .	1
1.2	What’s an MBA to do? . . . . .	2
1.3	Why Model Problems? . . . . .	3
1.4	Why Model Decision Problems with Excel? . . . . .	3
1.5	The Feng Shui of Spreadsheets . . . . .	5
1.6	A Spreadsheet Makeover . . . . .	8
1.6.1	Julia’s Business Problem—A Very Uncertain Outcome . . . . .	8
1.6.2	Ram’s Critique . . . . .	11
1.6.3	Julia’s New and Improved Workbook . . . . .	11
1.7	Summary . . . . .	17
	Key Terms . . . . .	18
	Problems and Exercises . . . . .	18
<b>2</b>	<b>Presentation of Quantitative Data: Data Visualization</b> . . . . .	<b>21</b>
2.1	Introduction . . . . .	21
2.2	Data Classification . . . . .	22
2.3	Data Context and Data Orientation . . . . .	23
2.3.1	Data Preparation Advice . . . . .	26
2.4	Types of Charts and Graphs . . . . .	29
2.4.1	Ribbons and the Excel Menu System . . . . .	29
2.4.2	Some Frequently Used Charts . . . . .	31
2.4.3	Specific Steps for Creating a Chart . . . . .	35
2.5	An Example of Graphical Data Analysis and Presentation . . . . .	38
2.5.1	Example—Tere’s Budget for the 2nd Semester of College . . . . .	39
2.5.2	Collecting Data . . . . .	40
2.5.3	Summarizing Data . . . . .	40
2.5.4	Analyzing Data . . . . .	43
2.5.5	Presenting Data . . . . .	48
2.6	Some Final Practical Graphical Presentation Advice . . . . .	51

2.7	Summary . . . . .	55
	Key Terms . . . . .	56
	Problems and Exercises . . . . .	56
<b>3</b>	<b>Analysis of Quantitative Data . . . . .</b>	<b>59</b>
3.1	Introduction . . . . .	59
3.2	What Is Data Analysis? . . . . .	60
3.3	Data Analysis Tools . . . . .	61
3.4	Data Analysis for Two Data Sets . . . . .	64
3.4.1	Time Series Data: Visual Analysis . . . . .	66
3.4.2	Cross-Sectional Data: Visual Analysis . . . . .	68
3.4.3	Analysis of Time Series Data: Descriptive Statistics . . . . .	71
3.4.4	Analysis of Cross-Sectional Data: Descriptive Statistics . . . . .	72
3.5	Analysis of Time Series Data: Forecasting/Data Relationship Tools . . . . .	75
3.5.1	Graphical Analysis . . . . .	76
3.5.2	Linear Regression . . . . .	80
3.5.3	Covariance and Correlation . . . . .	86
3.5.4	Other Forecasting Models . . . . .	87
3.5.5	Findings . . . . .	88
3.6	Analysis of Cross-Sectional Data: Forecasting/Data Relationship Tools . . . . .	89
3.6.1	Findings . . . . .	96
3.7	Summary . . . . .	97
	Key Terms . . . . .	98
	Problems and Exercises . . . . .	99
<b>4</b>	<b>Presentation of Qualitative Data—Data Visualization . . . . .</b>	<b>103</b>
4.1	Introduction—What Is Qualitative Data? . . . . .	103
4.2	Essentials of Effective Qualitative Data Presentation . . . . .	104
4.2.1	Planning for Data Presentation and Preparation . . . . .	104
4.3	Data Entry and Manipulation . . . . .	107
4.3.1	Tools for Data Entry and Accuracy . . . . .	108
4.3.2	Data Transposition to Fit Excel . . . . .	112
4.3.3	Data Conversion with the Logical IF . . . . .	115
4.3.4	Data Conversion of Text from Non–Excel Sources . . . . .	118
4.4	Data Queries with Sort, Filter, and Advanced Filter . . . . .	121
4.4.1	Sorting Data . . . . .	122
4.4.2	Filtering Data . . . . .	124
4.4.3	Filter . . . . .	125
4.4.4	Advanced Filter . . . . .	129
4.5	An Example . . . . .	133
4.6	Summary . . . . .	139
	Key Terms . . . . .	140
	Problems and Exercises . . . . .	141

<b>5</b>	<b>Analysis of Qualitative Data</b> . . . . .	145
5.1	Introduction . . . . .	145
5.2	Essentials of Qualitative Data Analysis . . . . .	147
5.2.1	Dealing with Data Errors . . . . .	147
5.3	PivotChart or PivotTable Reports . . . . .	151
5.3.1	An Example . . . . .	151
5.3.2	PivotTables . . . . .	153
5.3.3	PivotCharts . . . . .	164
5.4	TiendaMía.com Example: Question 1 . . . . .	168
5.5	TiendaMía.com Example: Question 2 . . . . .	169
5.6	Summary . . . . .	175
	Key Terms . . . . .	175
	Problems and Exercises . . . . .	176
<b>6</b>	<b>Inferential Statistical Analysis of Data</b> . . . . .	179
6.1	Introduction . . . . .	180
6.2	Let the Statistical Technique Fit the Data . . . . .	181
6.3	$\chi^2$ —Chi-Square Test of Independence for Categorical Data . . . . .	181
6.3.1	Tests of Hypothesis—Null and Alternative . . . . .	182
6.4	z-Test and t-Test of Categorical and Interval Data . . . . .	186
6.5	An Example . . . . .	186
6.5.1	z-Test: 2 Sample Means . . . . .	189
6.5.2	Is There a Difference in Scores for SC Non-prisoners and EB Trained SC Prisoners? . . . . .	190
6.5.3	t-Test: Two Samples Unequal Variances . . . . .	193
6.5.4	Do Texas Prisoners Score Higher than Texas Non-prisoners? . . . . .	193
6.5.5	Do Prisoners Score Higher Than Non-prisoners Regardless of the State? . . . . .	195
6.5.6	How Do Scores Differ Among Prisoners of SC and Texas Before Special Training? . . . . .	196
6.5.7	Does the EB Training Program Improve Prisoner Scores? . . . . .	198
6.5.8	What If the Observations Means Are the Same, But We Do Not See Consistent Movement of Scores? . . . . .	199
6.5.9	Summary Comments . . . . .	199
6.6	Confidence Intervals for Sample Statistics . . . . .	201
6.6.1	What Are the Ingredients of a Confidence Interval? . . . . .	202
6.6.2	A Confidence Interval Example . . . . .	203
6.6.3	Single Sample Hypothesis Tests Are Similar to Confidence Intervals . . . . .	204
6.7	ANOVA . . . . .	207
6.7.1	ANOVA: Single Factor Example . . . . .	207
6.7.2	Do the Mean Monthly Losses of Reefers Suggest That the Means Are Different for the Three Ports? . . . . .	209

6.8	Experimental Design . . . . .	210
6.8.1	Randomized Complete Block Design Example . . . . .	213
6.8.2	Factorial Experimental Design Example . . . . .	216
6.9	Summary . . . . .	219
	Key Terms . . . . .	221
	Problems and Exercises . . . . .	221
<b>7</b>	<b>Modeling and Simulation: Part 1 . . . . .</b>	<b>225</b>
7.1	Introduction . . . . .	225
7.1.1	What Is a Model? . . . . .	227
7.2	How Do We Classify Models? . . . . .	229
7.3	An Example of Deterministic Modeling . . . . .	231
7.3.1	A Preliminary Analysis of the Event . . . . .	232
7.4	Understanding the Important Elements of a Model . . . . .	235
7.4.1	Pre-modeling or Design Phase . . . . .	236
7.4.2	Modeling Phase . . . . .	236
7.4.3	Resolution of Weather and Related Attendance . . . . .	240
7.4.4	Attendees Play Games of Chance . . . . .	241
7.4.5	Fr. Efa's What-if Questions . . . . .	243
7.4.6	Summary of OLPS Modeling Effort . . . . .	244
7.5	Model Building with Excel . . . . .	245
7.5.1	Basic Model . . . . .	246
7.5.2	Sensitivity Analysis . . . . .	248
7.5.3	Controls from the Forms Control Tools . . . . .	255
7.5.4	Option Buttons . . . . .	256
7.5.5	Scroll Bars . . . . .	259
7.6	Summary . . . . .	261
	Key Terms . . . . .	261
	Problems and Exercises . . . . .	262
<b>8</b>	<b>Modeling and Simulation: Part 2 . . . . .</b>	<b>265</b>
8.1	Introduction . . . . .	265
8.2	Types of Simulation and Uncertainty . . . . .	267
8.2.1	Incorporating Uncertain Processes in Models . . . . .	267
8.3	The Monte Carlo Sampling Methodology . . . . .	268
8.3.1	Implementing Monte Carlo Simulation Methods . . . . .	269
8.3.2	A Word About Probability Distributions . . . . .	274
8.3.3	Modeling Arrivals with the Poisson Distribution . . . . .	278
8.3.4	VLOOKUP and HLOOKUP Functions . . . . .	280
8.4	A Financial Example—Income Statement . . . . .	282
8.5	An Operations Example—Autohaus . . . . .	286
8.5.1	Status of Autohaus Model . . . . .	291
8.5.2	Building the Brain Worksheet . . . . .	292
8.5.3	Building the Calculation Worksheet . . . . .	294

8.5.4	Variation in Approaches to Poisson Arrivals: Consideration of Modeling Accuracy . . . . .	296
8.5.5	Sufficient Sample Size . . . . .	297
8.5.6	Building the Data Collection Worksheet . . . . .	298
8.5.7	Results . . . . .	303
8.6	Summary . . . . .	307
	Key Terms . . . . .	307
	Problems and Exercises . . . . .	308
<b>9</b>	<b>Solver, Scenarios, and Goal Seek Tools . . . . .</b>	<b>311</b>
9.1	Introduction . . . . .	311
9.2	Solver–Constrained Optimization . . . . .	313
9.3	Example–York River Archaeology Budgeting . . . . .	314
9.3.1	Formulation . . . . .	316
9.3.2	Formulation of YRA Problem . . . . .	318
9.3.3	Preparing a Solver Worksheet . . . . .	318
9.3.4	Using Solver . . . . .	322
9.3.5	Solver Reports . . . . .	323
9.3.6	Some Questions for YRA . . . . .	328
9.4	Scenarios . . . . .	334
9.4.1	Example 1—Mortgage Interest Calculations . . . . .	334
9.4.2	Example 2—An Income Statement Analysis . . . . .	337
9.5	Goal Seek . . . . .	338
9.5.1	Example 1—Goal Seek Applied to the PMT Cell . . . . .	339
9.5.2	Example 2—Goal Seek Applied to the CUMIPMT Cell . . . . .	341
9.6	Summary . . . . .	342
	Key Terms . . . . .	343
	Problems and Exercises . . . . .	344