Contents

List of Tables xiii
List of Figures xvii

CHAPTER 1
Statistics—The Word 1
Descriptive Statistics 1
Inferential Statistics 2
References 6

CHAPTER 2
Distributions 7
The Frequency Distribution 7
Summary Measures 8
Graphs 11
References 14

CHAPTER 3
Special Averages 15
Index Numbers 16
Some History 19
The Harmonic Mean 22
Averaging Time Rates 23
Simpson's Paradox 24
References 25

CHAPTER 4
Making Comparisons 26
Comparing Observations 26
Standard Scores 28

Comparing Variables 29
Median and Quartiles 30
Boxplots 32
Ordinal Data 35
The Dollar Scale 37
References 37

CHAPTER 5
Probability 39

Laplace's Principles of Probability 40
Counting the Ways 45
Poker Hands 46
The Birthday Problem 48
Probability in Court 49
Which Question Was That? 50
References 51

CHAPTER 6
Craps and Binomial 52

Probabilities for Craps 52
The Binomial Distribution 54
Inference from the Binomial 56
Interval Estimates 59
References 60

CHAPTER 7
Horsekicks, Deadly Quarrels, and Flying Bombs 61

The Poisson Distribution 61
The Exponential Distribution 64
A Problem of Authorship 66
References 67

CHAPTER 8
Normal Distribution 68

The Standard Normal Distribution 72
Probability Distribution of the Sample Mean 74
Process Control Chart 76
The Central Limit Theorem 78
References 78

CHAPTER 9
Political Arithmetic 79

Beginnings in England 79
America to 1790 80
The United States, 1790–1900 81
Statistics and Social Issues 82

1900–1950 85
Since 1950 86
References 87

CHAPTER 10
Regression and Correlation 89

The Regression Line 92
Variation from Regression 95
Correlation and Galton 97
References 99

CHAPTER 11
Karl Pearson 100

Karl Pearson—to 1901 100
Chi-Square Goodness-of-Fit Test 102
Karl Pearson—from 1901 105
References 107

CHAPTER 12
Pearson to Gosset to Fisher 108

William S. Gosset (Student) 108
Ronald A. Fisher 109
Using the *t*-Distribution 110
References 113

CHAPTER 13
More Regression 115

Standard Error of the Regression Coefficient 115
Transformations 116
Multiple Regression and Correlation 121
History and Applications 124
References 126

CHAPTER 14
R. A. Fisher 127

The Analysis of Variance 127
R. A. Fisher—from 1925 130
Experimental Design 131
Postscript 135
References 136

CHAPTER 15
Sampling: Polls and Surveys 137

Proportions 138
Coefficient of Variation 139

Random Numbers 140
Sampling Methods 142
Election Polls 144
Estimating Sample Size 146
A National Sample 149
References 150

CHAPTER 16
Quality Control 151

Quality Control to 1930 151
Sampling Inspection 152
The 1930s 154
QC Goes to War 156
Sequential Sampling 160
Post-World War and Today 161
References 162

CHAPTER 17
Principal Components and Factor Analysis 163

The Principal Component 165
General Intelligence 170
Criticism 174
Ways of Life—An Example 175
Factor Rotation 175
Semantic Analysis of the Ways 176
A Three-Dimensional Map 177
References 180

CHAPTER 18
Jerzy Neyman 182

E. S. Pearson to Gosset to Neyman 183
Neyman–Pearson Tests 183
The Power of a Test 185
Confidence Intervals 187
Statistical Issues and Personalities of the 1930s 189
Neyman in America 194
References 195

CHAPTER 19
The Bayesian Bandwagon 197

Utility 197
Utility After Bernoulli 200
Bayes' Theorem 201
The Value of Information 203
Break-Even Problems 204
Bayesian Estimation—The Newsboy Problem 207

Subjective Probability 209
Assessing Subjective Probabilities 210
Bayesian Statistics 214
References 214

CHAPTER 20
Observational Studies and Program Evaluation 216

The Language of Cause 216
Rival Explanations 218
Analytical Control 220
Auto Death Rates and Safety Inspections 221
Systems of Relationships 224
Discriminant Analysis 228
A Discriminant Analysis of Selection Factors 228
Evaluation and Controlled Experimentation 231
References 234

CHAPTER 21
Nonparametrics and Robust Methods 236

The Wilcoxon Signed-Rank Test 238
Robustness and Student's *t* 239
Robust Estimation 241
The Jacknife 243
Exploratory Data Analysis 245
References 251

CHAPTER 22
Statistics—A Summing Up 253

References 260

Bibliography 261
List of Names 269
Subject Index 273