Contents

Chapter 1 Introduction 1

- 1.1 Introduction 1
- 1.2 The Role of Statistics 3
- 1.3 Descriptive and Inferential Statistics 4
- 1.4 Statistical Decision Theory 5
- 1.5 Applications of Statistics 5
- 1.6 Errors in Statistical Studies 7

Chapter 2 Statistical Investigations and Data 14

- 2.1 Formulation of the Problem 14
- 2.2 Design of the Investigation 15
- 2.3 Construction of Methodology 17
- 2.4 Some Fundamental Concepts 18
- 2.5 Collection of Statistical Data 27
- 2.6 Ratios 29

Chapter 3 Frequency Distributions and Summary Measures 33

- 3.1 Frequency Distributions 35
- 3.2 Construction of a Frequency Distribution 36

3.4	Other Considerations in Constructing Frequency Distributions	40		
3.5	Graphic Presentation of Frequency Distributions 41			
3.6	Cumulative Frequency Distributions 43			
3.7	Descriptive Measures for Frequency Distributions 46			
3.8	The Arithmetic Mean 47			
3.9	The Weighted Arithmetic Mean 50			
3.10	The Median 51			
3.11	Characteristics and Uses of the Arithmetic Mean and Median	53		
3.12	The Mode 55			
3.13	Dispersion – Distance Measures 62			
3.14	Dispersion – Average Deviation Methods 63			
3.15	Relative Dispersion - Coefficient of Variation 67			
3.16	Errors of Predictions 68			
3.17	Problems of Interpretation 69			
Chapter	4 Introduction to Probability 72			
4.1	The Meaning of Probability 72			
4.2	Elementary Probability Rules 80			
4.3	Bayes' Theorem 90			
Chapter	7 5 Probability Distributions 96			
5.1	Probability Distributions 96			
5.2	Mathematical Expectation 101			
5.3	The Binomial Distribution 106			
5.4	The Poisson Distribution 113			
Chapter	6 Sampling Distributions 118			
6.1	Fundamentals of Sampling 118			
6.2	The Binomial as a Sampling Distribution 122			
6.3	Continuous Distributions 126			
6.4	The Normal Distribution 129			
6.5	Sampling Distribution of the Mean 136			
6.6	Other Probability Sample Designs 145			
Chapter	7 Estimation 147			
7.1	Point and Interval Estimation 147			
7.2	Confidence Interval Estimation (Large Samples) 149			
7.3	Confidence Interval Estimation (Small Samples) 156			
7.4	Determination of Sample Size 160			

Determination of Sample Size 160

3.3

Class Limits 39

Chapter &	8	Hypothesis	Testing	166
-----------	---	------------	---------	-----

- 8.1 The Rationale of Hypothesis Testing 166
- 8.2 One-Sample Tests (Large Samples) 171
- 8.3 Two-Sample Tests (Large Samples) 188
- 8.4 The *t*-Distribution (Small Samples) Population Standard Deviation(s) Unknown 200
- 8.5 Summary and Looking Ahead 204

Chapter 9 Chi-Square Tests and Analysis of Variance 205

- 9.1 Tests of Independence 205
- 9.2 Analysis of Variance: Tests for Equality of Several Means 215

Chapter 10 Regression and Correlation Analysis 231

- 10.1 Introduction 231
- 10.2 Scatter Diagrams 233
- 10.3 Purposes of Regression and Correlation Analysis 237
- 10.4 Estimation Using the Regression Line 238
- 10.5 The Standard Error of Estimate 245
- 10.6 Correlation Analysis Measures of Association 248
- 10.7 Inference about Population Parameters in Regression and Correlation 256
- 10.8 Caveats and Limitations 260
- 10.9 Multiple Regression and Correlation Analysis 266

Chapter 11 Nonparametric Statistics 276

- 11.1 Introduction 276
- 11.2 The Sign Test 277
- 11.3 Mann-Whitney U Test (Rank Sum Test) 281
- 11.4 One-Sample Runs Tests 283
- 11.5 Rank Correlation 288
- 11.6 Goodness of Fit Tests 292

Chapter 12 Decision Making Under Uncertainty 298

- 12.1 Introduction 298
- 12.2 Structure of the Decision-Making Problem 298

CONTENTS ix

12.3	An Illustrative Example 300
12.4	Criteria of Choice 301
12.5	Expected Value of Perfect Information 308
12.6	Decision Diagram Representation 310
12.7	Incorporation of Sample Information 315
12.8	Posterior Analysis 315
12.9	Decision Making Based on Expected Utility 319
apter	<i>~ 13 Time Series</i> 330
13.1	Introduction 330

Ch

- 13.2 The Classical Time Series Model 331
- 13.3 Description of Trend 334
- 13.4 The Fitting of Trend Lines by the Method of Least Squares 335
- 13.5 Measurement of Seasonal Variations 346
- 13.6 Forecasting Methods 357

Chapter 14 Index Numbers 364

- 14.1 The Need for and Use of Index Numbers 364
- 14.2 Aggregative Price Indices 366
- 14.3 Average of Relatives Indices 371
- 14.4 General Problems of Index Number Construction 376
- 14.5 Quantity Indices 379
- 14.6 Deflation of Value Series by Price Indices 381
- 14.7 Selected Considerations in the Use of Index Numbers 384

Bibliography 386 Appendix A Tables 389 Appendix B Symbols, Subscripts, and Summations 416 Appendix C Shortcut Formulas 420 Answers to Even-Numbered Exercises 423 Index 447

CONTENTS