

CONTENTS

PREFACE

Chapter 1 PROBABILITY

1.0 Introduction	1
1.1 Theoretical probability: symmetry	1
1.2 Empirical probability: experiment	5
1.3 Empirical probability: observation	7
1.4 Combined events	9
1.5 Tree diagrams	13
1.6 Conditional probability	16
1.7 Independence	20
1.8 Miscellaneous Exercises	24

Chapter 2 DATA COLLECTION

2.0 Introduction	29
2.1 What sort of data?	31
2.2 Sources of data	33
2.3 Sampling: factors and bias	35
2.4 Miscellaneous Exercises	45

Chapter 3 DESCRIPTIVE STATISTICS

3.0 Introduction	47
3.1 Sorting and grouping	47
3.2 Illustrating data - bar charts	51
3.3 Illustrating data - pie charts	56
3.4 Illustrating data - line graphs and scattergrams	57
3.5 Using computer software	58
3.6 What is typical?	60
3.7 Grouped data	62
3.8 Interpreting the mean	65
3.9 Using your calculator	67
3.10 How spread out are the data?	68
3.11 Standard deviation	73
3.12 Miscellaneous Exercises	80

Chapter 4 DISCRETE PROBABILITY DISTRIBUTIONS

4.0 Introduction	87
4.1 Expectation	88
4.2 Variance	90
4.3 Probability distributions	92
4.4 The uniform distribution	95
4.5 Miscellaneous Exercises	97

Chapter 5 BINOMIAL DISTRIBUTION

5.0 Introduction	99
5.1 Finding the distribution	99
5.2 The mean and variance of the binomial distribution	107
5.3 Miscellaneous Exercises	112

Chapter 6 POISSON DISTRIBUTIONS

6.0 Introduction	115
6.1 Developing the distribution	116
6.2 Combining Poisson variables	121
6.3 The Poisson distribution as an approximation to the binomial	126
6.4 Miscellaneous Exercises	129

Chapter 7 CONTINUOUS PROBABILITY DISTRIBUTIONS

7.0 Introduction	131
7.1 Looking at the data	132
7.2 Finding a function	134
7.3 Calculating probabilities	138
7.4 Mean and variance	140
7.5 Mode, median and quartiles	143
7.6 Rectangular distribution	146
7.7 Miscellaneous Exercises	148

Chapter 8 THE NORMAL DISTRIBUTION		Chapter 11 CHI-SQUARED		
8.0	Introduction	151	11.0 Introduction	203
8.1	Looking at your data	152	11.1 The chi-squared table	204
8.2	The p.d.f. of the normal	155	11.2 Contingency tables	208
8.3	Transformation of normal p.d.f.s	157	11.3 Miscellaneous Exercises	212
8.4	More complicated examples	160		
8.5	Using the normal as an approximation to other distributions	162	Chapter 12 CORRELATION AND REGRESSION	
8.6	A very important application of the normal	169	12.0 Introduction	215
8.7	Miscellaneous Exercises	170	12.1 Ideas for data collection	215
			12.2 Studying results	216
			12.3 Pearson's product moment correlation coefficient	219
			12.4 Spearman's rank correlation coefficient	224
			12.5 Linear regression	230
			12.6 Bivariate distributions	234
			12.7 Miscellaneous Exercises	237
Chapter 9 ESTIMATION			ANSWERS	
9.0	Introduction	173		243
9.1	Sampling methods	174		
9.2	Sample size	176		
9.3	The distribution of \bar{X}	177		
9.4	Identifying unusual samples	179		
9.5	Confidence intervals	181		
9.6	Miscellaneous Exercises	185		
Chapter 10 HYPOTHESIS TESTING			INDEX	
10.0	Introduction	189		251
10.1	Forming a hypothesis	190		
10.2	The sign test	192		
10.3	Hypothesis testing for a mean	195		
10.4	Hypothesis testing summary	199		
10.5	Miscellaneous Exercises	201		