

---

# *Contents*

---

<i>Foreword</i>	v
<i>Preface</i>	vii
<b>1 WHY STATISTICS ?</b>	1
1.1 Statistics and Management	1
1.2 Basic Mathematical Notation	4
<b>2 PRESENTATION OF DATA</b>	11
2.1 Introduction	11
2.2 Graphical Representation	11
2.3 Representative Statistics	27
2.4 Summary	46
<b>3 MEASURING UNCERTAINTY</b>	55
3.1 Uncertainty and Probability	55
3.2 Relative Frequency Histogram	56
3.3 Probability Distributions—Continuous	59
3.4 Arithmetic of Probability	68
3.5 Expected Values	72
3.6 Probability Distributions – Discrete	73
3.7 Summary	82
<b>4 SAMPLES AND SAMPLING</b>	84
4.1 Introduction	84
4.2 Random Selection	84
4.3 Properties of Sample Means	85
4.4 Sampling Distributions	91
4.5 Estimation and Estimators	92
4.6 Sampling of Proportions	94
4.7 Summary	96
<b>5 SAMPLING PROCESSES</b>	98
5.1 Introduction	98

5.2	Sample Size and Confidence Limits	98
5.3	Sample Size and Cost	99
5.4	Sampling Schemes	102
5.5	Miscellaneous Sampling Procedures	111
5.6	Summary	112
6	SIGNIFICANCE TESTING	114
6.1	Introduction	114
6.2	Logical Framework	114
6.3	Degrees of Freedom	115
6.4	Variance Ratio Test ('F' Test)	116
6.5	Use of the Normal Distribution	117
6.6	The 't' Distribution (Student's 't')	118
6.7	Chi-squared Test	123
6.8	One- and Two-tailed Tests	127
6.9	Summary	129
7	DISTRIBUTION-FREE SIGNIFICANCE TESTS	132
7.1	Introduction	132
7.2	Ranking of Values	132
7.3	Tied Ranks	133
7.4	Arithmetic of Rank Order Numbers	133
7.5	Basic Test Logic	134
7.6	Wilcoxon's Sums of Ranks Test	134
7.7	Wilcoxon's Test for Unequal Sample Sizes	136
7.8	Wilcoxon's Signed Rank Test	137
7.9	Kruskal and Wallis Test	138
7.10	'Quick and Dirty' Methods	140
7.11	$2 \cdot \sqrt{N}$ Test	140
7.12	Trend Test: $2 \cdot \sqrt{N}$ Application	141
7.13	Correlation Test: $2 \cdot \sqrt{N}$ Application	142
7.14	Tukey's Test	143
7.15	Summary	144
8	CONDITIONAL PROBABILITY AND BAYES' THEOREM	146
8.1	Introduction	146
8.2	Manipulation of Conditional Probabilities	147
8.3	Bayes' Theorem	148
8.4	'Updating' Probabilities	149
8.5	Discriminating Power of Test Procedures	151
8.6	Bayes' Theorem and Sampling	152
8.7	Summary	158

<b>9 INDEX NUMBERS</b>	160
9.1 Introduction	160
9.2 Construction of Index Numbers	160
9.3 Manipulation of Index Numbers	163
9.4 The Index of Retail Prices	167
9.5 Summary	168
<b>10 RELATIONSHIPS BETWEEN FACTORS</b>	171
10.1 Introduction	171
10.2 Scatter Diagrams	172
10.3 Fitting a Straight Line	175
10.4 Correlation	181
10.5 Rank Correlation	184
10.6 Confidence Limits	187
10.7 Non-linear Regression	190
10.8 Summary	191
<b>11 DEMAND FORECASTING</b>	195
11.1 Introduction	195
11.2 Constant Model	197
11.3 Linear Trend Model	204
11.4 Seasonal Model	208
11.5 Choosing the Appropriate Model	212
11.6 Control of Forecasts and Adaptive Systems	212
11.7 Summary	213
<b>12 SOME ANALYSES OF MARKET STUDIES</b>	217
12.1 Introduction	217
12.2 Experimental Studies	217
12.3 Observational Studies	219
12.4 Summary	225
<b>APPENDIXES</b>	226
Tables of Statistical Distributions	
T.1 Area under the standard normal curve	236
T.2 Distribution of $t$ with $n$ degrees of freedom	237
T.3 Distribution of $\chi^2$ with $n$ degrees of freedom	238
T.4a Variance ratio (or $F$ distribution) 5% points	240
T.4b Variance ratio (or $F$ distribution) 1% points	241
T.5 Random numbers	242
<i>References</i>	243
<i>Answers to Exercises</i>	246
<i>Index</i>	253