

Table of Contents

<i>Preface</i>	ix
1. <i>Sample Spaces</i>	1
1.1 Experimental Models	1
1.2 Random Experiments	4
1.3 Events	10
2. <i>Probability</i>	19
2.1 Probability Spaces	19
2.2 Probability Theorems	24
2.3 Finite Sample Spaces	29
2.4 Uncountable Sample Spaces	37
2.5 Conditional Probability	42
2.6 Independent Events	48
3. <i>Random Variables</i>	54
3.1 Functions	55
3.2 Random Variables	62
3.3 Distribution Functions	68
3.4 Discrete Random Variables	74
3.5 Continuous Random Variables	79
3.6 Compositions of Random Variables	88
4. <i>Generating Functions</i>	97
4.1 Mathematical Expectation	97
4.2 Moments	102
4.3 Moment Generating Functions	108
4.4 Other Distribution Characteristics	116
5. <i>Distribution Families</i>	122
5.1 Indexing Parameters	123
5.2 Discrete Families	126

5.3	Continuous Families	139
5.4	Normal Family	153
6.	<i>Random Vectors</i>	163
6.1	Euclidean Spaces	164
6.2	Random Vectors	175
6.3	Discrete and Continuous Vectors	180
6.4	Conditional Distributions and Independence	193
6.5	Compositions	210
6.6	Joint Moments and Generating Functions	229
7.	<i>Multivariate Families</i>	248
7.1	Multinomial Family	249
7.2	Matrices	255
7.3	Multivariate Normal Family	265
8.	<i>Sampling and Asymptotic Theory</i>	280
8.1	Samples	280
8.2	Statistics	291
8.3	The t and F Distributions	301
8.4	Order Statistics	310
8.5	Asymptotic Distributions	317
8.6	Approximations	327
9.	<i>Estimation</i>	337
9.1	Estimates and Estimators	338
9.2	Estimation Criteria	341
9.3	Method of Moments	349
9.4	Method of Maximum Likelihood	353
9.5	Estimating Functions of Parameters	365
9.6	Interval Estimation	371
10.	<i>Decision Theory</i>	384
10.1	Estimation as Decision-Making	385
10.2	Utility	388
10.3	Loss Risk and Regret	394
10.4	Decision Theory and Theory of Games	397
10.5	Bayes Decision Rules	402
10.6	Bayes Estimation	410

11.	<i>Hypothesis-Testing</i>	420
11.1	Decision Theoretic Formulation	421
11.2	Simple Hypotheses	429
11.3	One-Sided Hypotheses	437
11.4	Two-Sided Alternatives	445
11.5	Two-Sample Tests	454
11.6	Other Tests	466
12.	<i>Linear Regression</i>	475
12.1	General Linear Hypothesis	477
12.2	Simple Regression Model	482
12.3	Tests of Hypotheses	489
12.4	Prediction	495
12.5	Discrimination	502
12.6	Gauss–Markov Theorem	507
13.	<i>Multiple Classifications</i>	513
13.1	Partitioning Quadratic Forms	514
13.2	Analysis of Variance	523
13.3	Two-way Classifications	536
13.4	Chi-square Tests	549
	<i>Bibliography</i>	559
	<i>Appendix A: Summary of Probability Laws</i>	562
	<i>Appendix B: Tables</i>	564
B.1	Binomial Distribution	564
B.2	Poisson Distribution	566
B.3	Selected Percentiles for the Chi-Square Distribution	567
B.4	Standard Normal Distribution	568
B.5	Selected Percentiles for the t -Distribution	569
B.6	Selected Percentiles for the F Distribution	570
	<i>Answers to Selected Exercises</i>	573
	<i>Index</i>	608