

CONTENTS

Preface

ix

PART ONE: PROBABILITY MODELS

CHAPTER 1	SETS, SET OPERATIONS, AND TREE DIAGRAMS	3
	1-1 Sets and Set Operations	3
	1-2 Venn Diagrams and Partitions	10
	1-3 Sizes of Sets	17
	1-4 Sets of Outcomes and Trees	23
	Important Terms and Concepts	33
	Review Exercises	33
	Case Study: Data and Diagrams	36
CHAPTER 2	PROBABILITIES, COUNTING, AND EQUALLY LIKELY OUTCOMES	39
	2-1 Probabilities of Outcomes	39
	2-2 Equally Likely Outcomes	48
	2-3 Counting Arrangements: Permutations	53
	2-4 Counting Partitions: Combinations	59
	2-5 Using the Equiprobable Measure	66
	Important Terms and Concepts	70
	Review Exercises	70
	Case Study: Politics and Probabilities	73

CHAPTER 3	PROBABILITY THEORY	76
	3-1 Probability Measures: Basic Rules and Properties	76
	3-2 Conditional Probability and Independence	85
	3-3 Stochastic Processes and Trees	94
	3-4 Bayes Probabilities	103
	Important Terms and Concepts	113
	Review Exercises	113
	Case Study: Here Are the Symptoms, What Is the Disease?	116
CHAPTER 4	RANDOM VARIABLES, AVERAGES, AND STATISTICS	120
	4-1 Bernoulli Trials	120
	4-2 Random Variables and Probability Density Functions	130
	4-3 Expected Values and Standard Deviations of Random Variables	138
	4-4 Normal Random Variables	149
	4-5 The Normal Approximation to a Binomial Random Variable	166
	Important Terms and Concepts	177
	Review Exercises	177
	Case Study: How to Find a Live Virus Efficiently	180
PART TWO: LINEAR MODELS		
CHAPTER 5	LINEAR PROBLEMS IN TWO VARIABLES AND THEIR GRAPHS	185
	5-1 Equations and Graphs of Lines	185
	5-2 Systems of Lines	198
	5-3 Systems of Linear Inequalities in Two Variables	210
	5-4 Formulation of Linear Programming Problems	216
	5-5 Graphical Solution of Linear Programming Problems	224
	Important Terms and Concepts	233
	Review Exercises	233
	Case Study: Keeping Down the Dollar Cost of Data	237
CHAPTER 6	SYSTEMS OF LINEAR EQUATIONS AND MATRICES	241
	6-1 Linear Equations and Matrix Notation	241
	6-2 Solution of Systems of Linear Equations	254
	6-3 Matrix Algebra	268
	6-4 Matrix Inverses	275
	6-5 A Linear Economic Model	285

	Important Terms and Concepts	293
	Review Exercises	293
	Case Study: Trapping in a Timber Tract	296
CHAPTER 7	COMPUTATIONAL METHODS FOR LINEAR PROGRAMMING	299
	7-1 Formulation of Problems	299
	7-2 Slack Variables and Basic Solutions	307
	7-3 Tableaus and the Pivot Operation	315
	7-4 Optimal Vectors via the Simplex Method	325
	7-5 Dual Programming Problems	334
	Important Terms and Concepts	348
	Review Exercises	348
	Case Study: Pollution on the Peacock	353
PART THREE: APPLICATIONS		
CHAPTER 8	MARKOV CHAINS	361
	8-1 States, Transitions, Transition Diagrams, and Transition Matrices	361
	8-2 Basic Properties of Markov Chains	369
	8-3 Regular Markov Chains	379
	8-4 Absorbing Markov Chains	392
	Important Terms and Concepts	402
	Review Exercises	403
CHAPTER 9	TWO-PERSON ZERO-SUM GAMES	406
	9-1 Two Simple Games	406
	9-2 Saddle Points and Dominance	411
	9-3 Solving $2 \times n$ and $m \times 2$ Games	419
	9-4 Solving $m \times n$ Games by Using the Simplex Method	427
	Important Terms and Concepts	434
	Review Exercises	434
CHAPTER 10	DIGRAPHS AND NETWORKS	436
	10-1 Digraphs, Matrices, and a Chain of Command	436
	10-2 Distance Matrices, Indices, and Status	445
	10-3 Networks	453
	Important Terms and Concepts	462
	Review Exercises	462

CHAPTER 11	INTEREST, MORTGAGES, AND INVESTMENTS	463
11-1	Interest	463
11-2	The Present Value of Future Payments	473
11-3	Time Payments, Amortization, and Mortgages	483
11-4	Evaluating Investment Options	489
	Important Terms and Concepts	498
	Review Exercises	498
	APPENDIXES	501
A	Areas under the Standard Normal Curve	501
B	Success Probabilities for Bernoulli Processes	504
C	Answers to Odd-Numbered Exercises	506
	Glossary	551
	Indexes	557
	Index of Applications	
	Index	