## **Contents**

Acknowledgments

Preface

1. Introduction	
Preliminary Remarks	1
The Markovian Decision Model	2
Problems to Be Treated	5
Hierarchical Classification of Policies	6
Bibliographical Remarks	7
Problems	8
2. Finite Horizon Expected Cost Minimization	
Dynamic Programming	11
Computational Example	15
Pathologies	16
Bibliographical Remarks	17
Problem	17

xi xiii viii Contents

3. Some Existence Theorems	
Summary	19
Expected Discounted Cost Problem	20
Expected Average Cost Problem	25
First-Passage Problem	28
First Passage as a Discounted Cost Problem	31
Bibliographical Remarks	32
Problems	33
4. Computational Methods for the Discounted	Cost Problem
Introduction and Summary	35
Method of Successive Approximations	36
Policy Improvement Procedure	39
Linear Programming	41
Computational Examples	46
Bibliographical Remarks Problems	49
TOOLEMS	50
5. Computational Procedures for the Optimal I Problem	First-Passage
Introduction	53
Method of Successive Approximations	54
Policy Improvement Procedure	56
Linear Programming Formulations	57
Computational Examples	59
The Finite Horizon Problem as a First-Passage Problem Bibliographical Remarks	
Problems	62
Trodens	63
6. Expected Average Cost Criterion Computation Procedures	tional
Summary	65
Policy Improvement Procedure	66
Linear Programming Formulations	73
Policy Improvement, Linear Programming under Irreduce Assumption	cibility 78
Computational Example	78 81
Bibliographical Remarks	83
Problems	94

Contents	ix

7. State-Action Frequencies and Problems with Constraints		
Introduction and Summary Expected State-Action Frequencies Some Examples The Main Theorems and Applications State-Action Frequencies Bibliographical Remarks	87 88 89 91 98 102	
8. Optimal Stopping of a Markov Chain		
Statement of the Problem Stopping Problem as an Expected Average Gain Problem A Different Approach Computational Example The Dual Linear Programming Problem Some Other Forms of the Stopping Problem Bibliographical Remarks Problems	103 104 105 112 113 114 116	
9. Some Applications		
A Replacement Model A Surveillance-Maintenance-Replacement Model AOQL of Continuous Sampling Plans A Sequential Search Problem A Stochastic Traveling Salesman Problem Bibliographical Remarks	121 125 130 132 135 137	
Appendix A. Markov Chains	139	
Bibliographical Notes	142	
Appendix B. Some Theorems from Analysis and Probability Theory	143	
Bibliographical Notes	147	

x	Contents
Appendix C. Convex Sets and Linear Programming	149
Bibliographical Notes	152
References	153
Index	157