

Contents

CHAPTER	PAGE
1. BALLOT THEOREMS	1
1. Introduction	1
2. A Generalization of the Classical Ballot Theorem	2
3. Problems	7
References	8
2. FLUCTUATIONS OF SUMS OF RANDOM VARIABLES	10
4. Cyclically Interchangeable Random Variables	10
5. Interchangeable Random Variables and Independent, Identically Distributed Random Variables	11
6. The Distribution of the Maximum of $\{N_r - r\}$	14
7. A Discrete Generalization of the Classical Ruin Theorem	18
8. The Distribution of the Maximum of $\{r - N_r\}$	24
9. The Distribution of the Maximum for Dual Sequences	27
10. Examples	28
11. Other Methods	30
12. Problems	34
References	35
3. FLUCTUATIONS OF SAMPLE FUNCTIONS OF STOCHASTIC PROCESSES	37
13. Stochastic Processes with Cyclically Interchangeable Increments	37
14. Stochastic Processes with Interchangeable Increments and Stochastic Processes with Stationary Independent Increments	38
15. The Distribution of the Supremum for the Process $\{\chi(u) - u\}$	43
16. A Continuous Generalization of the Classical Ruin Theorem	49
	<i>ix</i>

17. The Distribution of the Supremum for the Process $\{u - \chi(u)\}$	55
18. The Distribution of the Supremum for Dual Processes	58
19. Examples	59
20. Problems	68
References	69
4. RANDOM WALK PROCESSES	71
21. Stochastic Processes with Interchangeable Increments and Stochastic Processes with Stationary Independent Increments Taking on Integral Values	71
22. A Random Walk Process	77
23. The Brownian Motion Process	80
24. Stochastic Processes with Stationary Independent Increments Having No Negative Jumps	83
25. Stochastic Processes with Stationary Independent Increments	89
26. Problems	90
References	91
5. QUEUING PROCESSES	93
27. Single Server Queues	93
28. Fluctuations of the Queue Size	97
29. Fluctuations of the Waiting Time	110
30. Problems	124
References	126
6. DAM AND STORAGE PROCESSES	130
31. Dam and Storage Processes	130
32. Fluctuations of the Content of Dams of Unlimited Capacity	130
33. Fluctuations of the Content of Dams of Finite Capacity	136
34. Problems	144
References	145
7. RISK PROCESSES	147
35. Insurance Risk Processes	147
36. Problems	158
References	159
8. ORDER STATISTICS	162
37. Another Extension of the Ballot Theorem	162
38. Order Statistics	169

39. Discrete Distributions	171
40. Continuous Distributions	174
41. Problems	183
References	184
APPENDIX	189
1. Some General Notions and Theorems	189
2. Independent and Identically Distributed Random Variables	192
3. Stochastic Processes with Stationary Independent Increments	196
4. Interchangeable Random Variables	200
5. Stochastic Processes with Interchangeable Increments	202
6. Abelian and Tauberian Theorems for Generating Functions	203
7. Abelian and Tauberian Theorems for Laplace-Stieltjes Transforms	205
8. Continuity Theorems for Distribution Functions and for their Transforms	206
9. Some Theorems on Functions of a Complex Variable	208
SOLUTIONS	211
1. Chapter 1	211
2. Chapter 2	215
3. Chapter 3	219
4. Chapter 4	224
5. Chapter 5	229
6. Chapter 6	237
7. Chapter 7	242
8. Chapter 8	245
INDEX	255