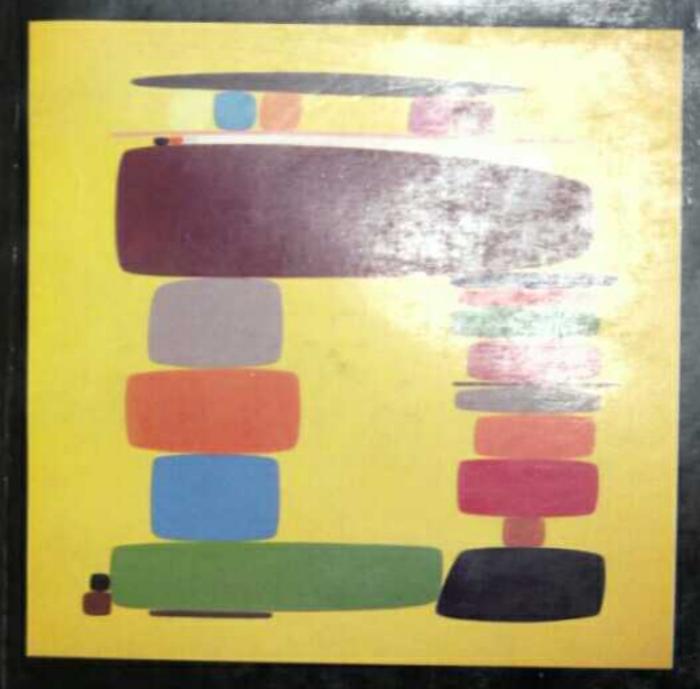
Eastern Economy Edition

DISCRETE MATHEMATICAL STRUCTURES

5TH EDITION



KOLMAN BUSBY ROSS



Contents

372

Prefac	ce '	VIII
A Wo	rd to	Students xii
1	Fun	damentals 1
	1.1	Sets and Subsets 2
	1.2	Operations on Sets 5
	1.3	Sequences 13
	1.4	Division in the Integers 20
	1.5	Matrices 32
	1.6	Mathematical Structures 41
2	Log	jic 50
	2.1	Propositions and Logical Operations 51
	2.2	Conditional Statements 57
	2.3	Methods of Proof 62
	2.4	Mathematical Induction 67
3	Cou	unting 78
	3.1	Permutations 79
	3.2	Combinations 83
	3.3	Pigeonhole Principle 88
	3.4	Elements of Probability 91
	3.5	Recurrence Relations 100
4	Rel	ations and Digraphs 110
	4.1	Product Sets and Partitions 111
	4.2	Relations and Digraphs 115
	4.3	Paths in Relations and Digraphs 123
	4.4	Properties of Relations 129
	4.5	Equivalence Relations 136
	4.6	Computer Representation of Relations and Digraphs 140
	4.7	Operations on Relations 147
	4.8	Transitive Closure and Warshall's Algorithm 157
5	Fur	ctions 168
	5.1	Functions 169
	5.2	Functions for Computer Science 178
	5.3	Growth of Functions 183
		Permutation Functions 188

6	Orde	er Relations and Structures 200	
	6.1	Partially Ordered Sets 201	
	6.2	Extremal Elements of Partially Ordered Sets 211	
	6.3	Lattices 216	
	6.4	Finite Boolean Algebras 226	
	6.5	Functions on Boolean Algebras 233	
	6.6	Circuit Design 237	
7	Tree	s 254	
	7.1	Trees 254	
	7.2	Labeled Trees 259	
	7.3	Tree Searching 264	
	7.4	Undirected Trees 273	
8	7.5	Minimal Spanning Trees 280	
	Topics in Graph Theory 290		
	8.1	Graphs 291	
	8.2	Euler Paths and Circuits 296	
	8.3	Hamiltonian Paths and Circuits 304	
	8.4	Transport Networks 307	
	8.5	Matching Problems 315	
9	8.6	Coloring Graphs 320	
	Semigroups and Groups 329		
	9.1	Binary Operations Revisited 330	
	9.2	Semigroups 334	
	9.3	Products and Quotients of Semigroups 341	
	9.4	Groups 347	
	9.5	Products and Quotients of Groups 358	
	9.6	Other Mathematical Structures 363	
10	Languages and Finite-State Machines 372		
	10.1	Languages 373	
	10.2		
	10.3	The state of the s	
	10.4		
	10.5		
	10.6	AND	

Groups and Coding 416

Coding of Binary Information and Error Detection

Decoding and Error Correction 428

11.3 Public Key Cryptology

Appendix A: Algorithms and Pseudocode

Appendix B: Additional Experiments in **Discrete Mathematics**

Answers to Odd-Numbered Exercises

Answers to Chapter Self-Tests 497

Glossary G-1

Index

Photo Credits