## Contents

1	
Logic ar	nd Circuits
	1.1 Propositions 2
	1.2 Conditional Propositions and Logical Equivalence 11
	1.3 Combinatorial Circuits 25
	1.4 Synthesis of Circuits 36
	1.5 Simplification of Boolean Expressions 43
	1.6 Number Systems and Circuits for Addition 55
	<b>1.7 Notes</b> 69
	Computer Exercises 70
	Chapter Review 71
	Chapter Self-Test 72

6	)
4	1
	-

The Language of	f Mathematics	77
2.1	Sets 78	
	More on Sets 85	
	Sequences 94	
	<b>Mathematical Induction</b> 107	
2.5	Functions 116	
2.6	More on Functions 127	
2.7	Matrices 134	
2.8	Notes 145	
	Computer Exercises 145	
	Chapter Review 146	
	Chapter Self-Test 148	
3		
<u>U</u>		
Graphs		153
	Introduction 154	
	Paths and Cycles 164	
†3.3	Hamiltonian Cycles and the Traveling	
	Salesperson Problem 179	
	Matrix Representations of Graphs 186	
	Isomorphic Graphs 194	
	Instant Insanity 202	
3.7	Notes 210	
	Computer Exercises 211	
	Chapter Review 212	
	Chapter Self-Test 213	
4		
Trees		217
	Introduction 218	
4.2	Terminology and Characterizations of Trees 228	

†Can be omitted without loss of continuity.

	4.6	Notes 266	
		Computer Exercises 266	
	- 12	Chapter Review 268	
	- 1719	Chapter Self-Test 269	
		7.5 2006	
9			
Algorithms	3	Chamber Substant 1	273
	5.1	Introduction 274	
	†5.2	Formal Algorithmic Notation 282	
		<b>Greatest Common Divisor Algorithm</b> 290	
	5.4	Analysis of Algorithms 300	
	5.5	Notes 311	
		Computer Exercises 312	
		Chapter Review 312	
		Chapter Self-Test 313	
6	÷ ,	. Ožr suco o s minora s	, ,
Permutation	is, Co	ombinations, and the	
Pigeonhole	Princ	ciple	317
	6.1	First Counting Principle 318	
	6.2	Second Counting Principle 326	
	6.3	Permutations 330	
	6.4	Combinations 336	
	6.5	The Binomial Theorem 346	
	†6.6	<b>Algorithms for Generating Permutations</b>	
		and Combinations 353	
	†6.7	The Pigeonhole Principle 362	
	6.8	Notes 371	
		Computer Exercises 371	
		Chapter Review 372	
		Chapter Self-Test 373	

234

253

†4.3 Binary Trees

†4.5 Game Trees

†**4.4 Isomorphic Trees** 243

Recurrence Rela	tions	3		
7.1	Introduction 378			
	Solving Recurrence Relations 392			
	7.2 Solving Recurrence Relations 7.3 Recursive Algorithms and Recurrence Relations			
	†7.4 Applications to the Analysis of Algorithms 41			
	Notes 420			
	Computer Exercises 420			
	Chapter Review 421			
	Chapter Self-Test 422			
8				
Relations	entition in the second of the second	42		
8.1	Introduction 426			
	<b>Equivalence Relations</b> 437			
	Matrices of Relations 443			
†8.4	Relational Data Bases 450			
	Notes 459			
	Computer Exercises 459			
	Chapter Review 460			
	Chapter Self-Test 461			
Appendix: More	on Logic	4		
A.1	<b>Proofs and Arguments</b> 465			
A.2	Categorical Propositions 474			
Refe	rences 489			
Acie				
Hint	s and Solutions to Selected Exercises 493			
Inde	x 553			