Contents

CHAPTER 1 Sets, Maps, and Relations	1
1.1 Sets	1
1.2 Exponents and Series	12
1.3 Maps and Relations	15
CHAPTER 2	31
Induction, Strings, and Languages	
2.1 Induction on the Natural Numbers	32
2.2 The Strings Over an Arbitrary Set	41
2.3 Languages and Automata: A First Look	47
2.4 Context-Free Grammars	53
2.5 Processing Lists	60
CHAPTER 3	
Counting, Recurrences, and Trees	73
3.1 Some Counting Principles	73
3.2 Trees and Recurrences	87
3.3 An Example of Algorithm Analysis	102
CHAPTER 4	
Switching Circuits, Proofs, and Logic	111
4.1 Truth Tables and Switching Circuits	111
4.2 Proving Theorems	131

vii

viii

CHAPTER 5	
Binary Relations, Lattices, and Infinity	145
5.1 Equivalence Relations and Partial Orders	145
5.2 Lattices and Boolean Algebras	155
5.3 An Introduction to Infinity	160
5.4 Another Look at Trees	167
CHAPTER 6	
Graphs, Matrices, and Machines	175
6.1 An Invitation to Graph Theory	175
6.2 Graphs and Matrices	186
6.3 Finite-State Acceptors and Their Graphs	199
Author Index	209
Notation Index	211
Subject Index	213