Contents

r re	<i>page</i> ix	
	face	xi
Intr	1	
1	Sentential Logic	8
1.1	Deductive Reasoning and Logical Connectives	8
1.2	Truth Tables	14
1.3	Variables and Sets	26
1.4	Operations on Sets	34
1.5	The Conditional and Biconditional Connectives	43
2	Quantificational Logic	55
2.1	Quantifiers	55
2.2	Equivalences Involving Quantifiers	64
2.3	More Operations on Sets	73
3	Proofs	84
3.1	Proof Strategies	84
3.2	Proofs Involving Negations and Conditionals	95
3.3	Proofs Involving Quantifiers	108
3.4	Proofs Involving Conjunctions and Biconditionals	124
3.5	Proofs Involving Disjunctions	136
3.6	Existence and Uniqueness Proofs	146
3.7	More Examples of Proofs	155
4	Relations	163
4.1	Ordered Pairs and Cartesian Products	163
4.2	Relations	171
4.3	More About Relations	180

'n	Contents	

	4.4	Ordering Relations	189
	4.5	Closures	202
	4.6	Equivalence Relations	213
	5	Functions	226
	5.1	Functions	226
	5.2	One-to-one and Onto	236
	5.3	Inverses of Functions	245
	5.4	Images and Inverse Images: A Research Project	255
	6	Mathematical Induction	260
	6.1	Proof by Mathematical Induction	260
	6.2	More Examples	267
	6.3	Recursion	279
	6.4	Strong Induction	288
	6.5	Closures Again	300
	7	Infinite Sets	306
	7.1	Equinumerous Sets	306
	7.2	Countable and Uncountable Sets	315
	7.3	The Cantor-Schröder-Bernstein Theorem	322
	Appendix 1: Solutions to Selected Exercises		329
	Appendix 2: Proof Designer		373
		375	
Suggestions for Further Reading Summary of Proof Techniques			376
Index			381