Contents

Preface		xiii
Par	t One: Sentential Logic	1
Cha	apter One: Introduction	1
1.	The Elements of an Argument	1
2.	Deduction and Induction	4
3.	Argument Forms	6
4.	Truth and Validity	8
5.	Soundness	11
6.	Consistency	11
<i>7</i> .	Consistency and Validity Compared	12
8.	Contexts of Discovery and Justification	14
	Key terms	15
Cha	apter Two: Truth-Functions	16
1.	Atomic and Compound Sentences	16
2.	Truth-Functions	17
3.	Conjunctions	18
4.	Variables and Constants	20
5.	Negations	21
6.	Parentheses and Brackets	23
<i>7</i> .	Disjunctions	24
8.	"Not Both" and "Neither Nor"	27
9.	Material Conditionals	29
<i>10</i> .	Material Biconditionals	31
<i>11</i> .	"Only If" and "Unless"	33
<i>12</i> .	Symbolizing Complex Sentences	35
	Key terms	41
Cha	pter Three: Truth Tables	43
1.	Computing Truth-Values	43
2.	Tautologies Contradictions and Contingent Sentences	18

viii Contents

3.	Logical Equivalences and Conditionals	53
4.	Truth Table Test of Validity	56
5.	Truth Table Test of Consistency	58
6.	Validity and Consistency	59
7.	The Short Truth Table Test for Invalidity	60
8.	The Short Truth Table Test for Consistency	64
9.	Sentence Forms and Substitution Instances	65
10.	Truth Tables and Forms	70
	Key terms	72
Cha	apter Four: Proofs	73
1.	Argument Forms	73
2.	Modus Ponens and Modus Tollens	75
<i>3</i> .	Disjunctive Syllogism and Hypothetical Syllogism	77
4.	Simplification and Conjunction	80
5.	Addition and Constructive Dilemma	81
6.	Principles of Strategy	83
<i>7</i> .	Double Negation and DeMorgan's Theorem	90
8.	Commutation, Association, and Distribution	92
9.		93
10.		94
11.	More Principles of Strategy	97
12.		101
	Key terms	107
Ch	apter Five: Conditional and Indirect Proofs	108
1.	Conditional Proofs	108
2.	Indirect Proofs	116
3.	Strategy Hints for Using Conditional Proof and Indirect Proof	121
4.	Theorems	122
5.	Proving Premises Inconsistent	123
6.	Adding Valid Argument Forms	124
7.	The Completeness of Sentential Logic	125
8.		127
	Key terms	130
	art Two: Predicate Logic	131
	napter Six: Predicate Logic Symbolizations	131
	•	131
1		135
2		136
3		140
4	Existential Quantifiers	141
5		143
6	i. The Square of Opposition	110

X			Contents
X			Comenis

<i>3</i> .	Properties of Relations	233
4.	Higher-Order Logics	236
5.	Limitations of Predicate Logic	238
6.	Philosophical Problems	241
<i>7</i> .	Logical Paradoxes	249
	Key terms	255
Cha	apter Twelve: Truth Trees	258
1.	The Sentential Logic Truth Tree Method	258
2.	The Truth Tree Rules	259
3.	Details of Tree Construction	266
4.	Rationale Behind the Tree Method	272
5.	Putting Truth Trees to Work	274
6.	The Predicate Logic Truth Tree Method	275
<i>7</i> .	Infinite Trees	280
	Key terms	282
 Par	t Three: Other Systems of Logic	283
Cha	apter Thirteen: Syllogistic Logic	283
1.	Categorical Propositions	283
2.	Existential Import	286
3.	The Square of Opposition	286
4.	Conversion, Obversion, Contraposition	290
<i>5</i> .	Syllogistic Logic—Not Assuming Existential Import	293
<i>6</i> .	Venn Diagrams	295
7.	Syllogisms	298
<i>7.</i> 8.	Determining Syllogism Validity	300
9.	Venn Diagram Proofs of Validity or Invalidity	301
10.	Five Rules for Determining Validity or Invalidity	306
10. 11.	Syllogistics Extended	309
12.	Enthymemes	312
13.	Sorites	313
13. 14.	Technical Restrictions and Limitations	315
14.	Key terms	318
Cha	apter Fourteen: Inductive Logic	321
1.	A Mistaken View of Induction and Deduction	321
2.	Kinds of Inductive Arguments	323
3.		333
4.	Mill's Methods	336
<i>5</i> .	Inductive Probability	343
6.	The Probability Calculus	344
7.		346

Contents

8.	Induction Is Unjustified—The Old Riddle of Induction	348
9.	Not All Instances of Theories Confirm Them—The New Riddle	
	of Induction	351
	Key terms	354
Cha	apter Fifteen: Axiom Systems	356
1.	The Nature of an Axiom System	356
2.	Interpreted and Uninterpreted Systems	357
3.	Properties of Axiom Systems	358
<i>4</i> .	Outline of an Axiom System for Sentential Logic	361
5.	Axiom Systems for Predicate Logic	366
6.	Other Kinds of Axiom Systems	367
<i>7</i> .	Objections to Axiom Systems	368
	Key terms	368
Cha	apter Sixteen: Alternative Logics	370
1.	Modal Logic	370
2.	Strict Implication	371
3.	Modal Axioms	373
4.	Modal Theorems	374
5.	Modal Paradoxes	375
6.	A Philosophical Problem	375
<i>7</i> .	Modal Predicate Logic	376
8.	Epistemic Logic: The Logic of Knowledge and Belief	378
9.	Epistemic Theorems	381
10.	Deontic Logic	382
11.	Problems with Deontic Systems	383
	Key terms	385
Ans	swers to Even-Numbered Exercise Items	387
Bib	liography	449
Special Symbols		453
, -	•	.55

455

Index