# Contents

Preface ix

- 1. The Subject Matter of Logic 1
  - 1.1 Logic and 'Logical Form' 1
  - 1.2 On the Nature of Propositions 3
  - 1.3 Ambiguity 5
  - 1.4 Logic and the Division of Labor 10
  - 1.5 Exercises 12
- 2. Propositional Logic I: Syntax 14
  - 2.1 Remarks on the Notion 'System of Formal Logic' 14
  - 2.2 Rules of Inference 24
  - 2.3 Language and Metalanguage 38
  - 2.4 Axiom versus Rule of Inference versus Meaning Postulate 44
  - 2.5 On the Structure of Proofs 47
  - 2.6 More on If 49
  - 2.7 Exercises 54
- 3. Propositional Logic II: Semantics 57
  - 3.1 Truth Tables 57
  - 3.2 How Do the Rules of Inference Constrain Truth Values? 61
  - 3.3 Validity and Satisfiability 69
  - 3.4 Different Kinds of 'Completeness' 74
  - 3.5 More on Conjunction 76
  - 3.6 More on Metalanguage 81
  - 3.7 Appendix: Sketch of a Proof of Semantic Completeness 83
  - 3.8 Exercises 85
- 4. Predicate Logic I: Syntax 87
  - 4.1 Quantifiers, Predicates, and Variables 87

# 4.2 The Logicians' Favorite Quantifiers 98

v

#### Contents

vi

•

- 4.3 Rules of Inference 104
- 4.4 Possible Objections to the Rules of Inference 111
- 4.5 Restricted and Unrestricted Quantifiers 118
- 4.6 Predicate Logic with Identity 123
- 4.7 Linguistic Justification for S: Q S 125
- 4.8 Exercises 136

#### 5. A Digression into Set Theory 139

- 5.1 The Notion of 'Set' 139
- 5.2 Operations of Sets 143
- 5.3 Finite and Infinite Sets 145

5.4 Proof by Induction 151

5.5 Relations and Functions 155

5.6 Valuations 157

5.7 Exercises 159

#### 6. Predicate Logic II: Semantics 161

6.1 Truth in Predicate Logic 161

6.2 Satisfiability and Validity 167

6.3 The Uniformity of the 'Domain' 170

6.4 Exercises 175

#### 7. Applications and Extensions of Predicate Logic 176

- 7.1 Russell's Analysis of The 176
- 7.2 The Bach-Peters Sentence 182
- 7.3 Comparatives 185
- 7.4 Conjunctions as Quantifiers 191
- 7.5 Sets in the Object Language; Extended Predicate L

7.6 Exercises 203

# 8. Speech Acts and Implicature 205

8.1 Speech Acts and Illocutionary Force 205

8.2 The Performative Analysis 210

#### vii Contents

- 8.3 Implicature: Grice Saves 215
- 8.4 Exercises 233

### 9. Presupposition 235

- 9.1 Kinds of Presupposition 235
- 9.2 Some Possible Cases of Semantic Presupposition 239
- 9.3 Supervaluations 242
- 9.4 Pragmatic Presupposition 251
- 9.5 Broad and Narrow Conceptions of Falsehood 258
- 9.6 Discourse Referents 262
- 9.7 Exercises 271

#### 10. Modal Logic 273

- 10.1 Introduction 273
- 10.2 Syntax and Semantics for Modal Propositional Logic 276
- 10.3 Modal Predicate Logic 285
- 10.4 Strict Implication and Relevant Entailment Logic 296
- 10.5 Appendix: Converses of the Theorems about Reflexivity, Symmetry, and Transitivity of the Accessibility Relation R 305

10.6 Exercises 309

### **11.** Applications of Possible Worlds 311

- 11.1 Counterfactual Conditionals 311
- 11.2 'World-creating' Predicates 326
- 11.3 Tense Logic 340
- 11,4 Exercises 358

#### 12. Many-valued and Fuzzy Logic 360

- 12.1 Values between 'True' and 'False' 360
- 12.2 Fuzzy Predicate Logic 370
- 12.3 Fuzzy Sets 378

12.4 Degrees of Truth 380

# viii Contents

12.5 Dimensions of Truth 385

12.6 Exercises 394

# 13. Intensional Logic and Montague Grammar 395

13.1 The  $\lambda$ -Calculus 395

13.2 Intensional Logic 401

13.3 Montague's Approach to Syntax and Semantics 406

13.4 Exercises 424

# 14. Further Topics in Quantification 425

14.1 Other Quantifiers 425

14.2 Mass Expressions 433

14.3 Generic Sentences 442

14.4 Branching Quantifiers 447

14.5 Quantifiers with Multiple Variables 457

14.6 Exercises 459

Notes 460

References 488

List of Symbols 499

Index 503

:

.

.