
Contents

Part I Propositional Logic

1	Introduction	3
2	Fundamental Logical Notions	7
2.1	Syntax	7
2.2	Semantics	8
2.3	Logical consequence and logical equivalence	8
	Exercises	9
3	The Resolution Method	13
3.1	Clauses and formulas as finite sets	13
3.2	Resolution	14
3.3	Davis-Putnam procedure (DPP)	16
	Exercises	17
4	Robinson's Completeness Theorem	19
4.1	Statement and proof	19
4.2	Refutation	22
	Exercises	23
5	Fast Classes for DPP	27
5.1	Krom clauses	27
5.2	Horn clauses	28
	Exercises	29
6	Gödel's Compactness Theorem	31
6.1	Preparatory material	31
6.2	Statement and proof	32
	Exercises	33

7	Propositional Logic: Syntax	35
7.1	Formulas	35
7.2	Unambiguity of the syntax	36
	Exercises	39
8	Propositional Logic: Semantics	41
8.1	Assignment, logical consequence, logical equivalence	41
	Exercises	42
9	Normal Forms	47
9.1	Some logical equivalences	47
9.2	Propositional logic and the logic of clauses	48
	Exercises	50
10	Recap: Expressivity and Efficiency	53

Part II Predicate Logic

11	The Quantifiers “There Exists” and “For All”	57
11.1	Introduction	57
	Exercises	59
12	Syntax of Predicate Logic	63
12.1	Elements of the syntax	63
12.2	Formalisation in clauses	64
12.3	Substitution of terms for variables	65
12.4	Herbrand universe	66
12.5	Refutation	67
	Exercises	69
13	The Meaning of Clauses	71
13.1	Tarski semantics: types and models	71
13.2	Tarski semantics: clauses	73
13.3	Instantiation, resolution and its correctness	74
	Exercises	75
14	Gödel’s Completeness Theorem for the Logic of Clauses ...	79
14.1	Introduction	79
14.2	Completeness and compactness	80
14.3	Comments on the Completeness Theorem	82
	Exercises	83
15	Equality Axioms	89
15.1	Introduction	89
15.2	Axiomatisation of the equality	90
	Exercises	92

	Contents	XI
16	The Predicate Logic \mathcal{L}	95
16.1	Introduction	95
16.2	Transformation of formulas in PNF	97
16.3	Skolemisation	99
16.4	Completeness, compactness and nonstandard models	101
	Exercises	103
17	Final Remarks	117
	Index	121



<http://www.springer.com/978-88-470-2360-4>

Logic: a Brief Course

Mundici, D.

2012, XI, 130 p., Softcover

ISBN: 978-88-470-2360-4