# Additional Information

Here you will find some information of what distinguishes this textbook from similar textbooks on mathematical logic; more precisely, what is contained in this textbook, hardly be found in *one and the same* textbook. For instance, one textbook may deal with logic programming but less with recursion theory, while in the next one a lot is found on recursion theory but nearly nothing on logic programming. This file is still under work.

### Chapter 1

1. The duality theory of Boolean functions and formulas (Theorem 2.3) and its applications on canonical normal forms.
2. Treating both Gentzen-style and Hilbert-style axiomatizations in extensio.
3. A method of proving completeness with the substitution method. The two-valued consequence relation is uniquely characterized by a few Gentzen-style rules, so that also its Post-completeness and structural completeness can easily be gained.
4. Useful applications of the propositional compactness theorem.
5. Complete axiomatization of some fragments of two-valued logic.

### Chapter 2

1. Presentation of the most important classes of structures to have sufficiently background material for predicate logic.
2. Comparison of what we call the local and the global consequence relation for first-order languages.
3. Extensive developement of the theory of explicit definitions.

### Chapter 3

1. Both Gentzen-style and Hilbert-style axiomatizations are presented for first-order logic.
2. Complete presentation and discussion of the axiom system ZFC for set theory.
3. Presentation of fragmentary first-order systems, in particular Birkhoff's calculus for equational theories and some generalizations.
4. Remarks on programming languages.

**Chapter 4**

1. Mathematical foundations of logic programming.
2. Constructive proof of the resolution theorem.
3. Complete correctness proof for the unification algorithm.

**Chapter 5**

1. Comprehensive discussion of model complete theories and model completions, up to Lindstroems criterion.
2. Model theoretic proofs of quantifier elimination for the theory $ACF$ of algebraic closed fields and the theory $RCF$ of real closed fields.
3. Various application of ultraproducts, including on logical matrices.

**Chapter 6**

1. Nearly complete presentation of the theory of primitive recursive functions.
2. A deeper analysis of the representation theorem.
3. Detailed discussion of Gödel's first incompleteness theorem in different formulations.
4. Discussion of the close relationship between logic and recursion theory.

**Chapter 7**

1. Rigorous proofs of the derivability conditions.
2. Detailed discussion of the second incompleteness theorem.
3. Presentation of the modal system $\mathsf{G}$ for a modal treatement of self-reference
4. Discussion of various results connected with the uniquness of fixed points in self-reference.
5. Presentation of a bimodal systems for the $\Sigma_3$-extension of Peano-Arithmetic.
6. Modal self-reference in axiomatic set theory.