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★Fathoming formal logic. Vol. I.

Theory and decision procedures for propositional logic.

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From the preface: “This text, volume I of a two-volume work titled *Fathoming Formal Logic*, examines in depth the so-called ‘standard’ propositional logic. This unusually extensive devotion of space to the simplest logical system of the familiar textbooks is justified, I think, for several reasons. Unlike Aristotelian logic, modern logic has a relatively recent progeny; reclaiming the preeminence due to the subject and making powerful formal apparatus available to the expert, modern formal logic still has not found its way to the attention of scholars across the range of disciplines. While meaning is, evidently, ubiquitous and foundational across the range of academic studies, the logical structure of meaning remains an arcane and elusive subject for most. The present work aspires to make available an in-depth analytical presentation of the fundamentals of modern formal logic to the ambitious student and scholar who seek to understand how formal logic works. Propositional logic is the place to start. As a theoretical work, the text undertakes a philosophically exploratory and technically rigorous investigation.

“The present text should appeal to those who are not acquainted with the intricacies of the formal study of Logic but are bent on suffering a rigorous regimen. This text encompasses certain topics and decision mechanisms that are usually missing from textbooks and can be canvassed only through acquaintance with ever larger chunks of the extant bibliography. Including detailed examples and exercises, the text can be deployed for an ambitious course of study; as such, it targets those who want their exposure to Formal Logic to be uncompromisingly rigorous.

“Unusual features of what is covered in the present volume are the following:

- ▷ I include ‘possible worlds’ analysis. In the same spirit, I show implications from the application of this fecund semantic trope for philosophic and linguistic analysis both in the body of the text and through appropriately crafted exercises. Unusually lengthy covering is accorded to the structural features, opportunities and limitations of the standard logics.
- ▷ I expand on non-cognitivism and analyticity as these subjects relate to formal logic, without entering into philosophical debates surrounding the topics.
- ▷ I devote unusually large space to the study of logical relations and, for a work that is not exclusively dedicated to the subject, I summon considerable detail to present proof-theoretic constructions (under the sections on natural deduction).
- ▷ I expatiate at length on alternative syntactical arrangements, alternative computational systems, intricate translational challenges, and on such metalogical concepts as Functional Completeness. Occasional excursions to Intuitionistic Logic are undertaken when proof systems are constructed.
- ▷ I present the full complement of definable binary truth functions and take a foray into a subject Ludwig Wittgenstein made much ado about—functional completeness.
- ▷ I have included extended sections of such rarely covered subjects as: applications of Truth Tables for tracking a Dynamic Flow of Information, Corrected Truth Tables, Semantic Trees (both Negative and so-called Positive Trees), Normal Forms and Karnaugh Maps, and a discussion of Normalization and Harmony in the proof-theoretic approach to the construction of natural-deduction sequent systems.
- ▷ Soundness and Completeness are covered theoretically, with emphasis on an anal-

ysis of the concepts, but metalogical proofs are deferred since Mathematical Induction is not included in the present text. The second volume includes an Appendix on Mathematical Induction as well as appendices on Set Theory—more urgently needed in the case of the study of Predicate Logic—and on Dialogical Logic.”