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A first course in mathematical logic and set theory.

Hoboken, NJ: John Wiley & Sons (ISBN 978-0-470-90588-3/hbk; 978-1-118-54801-1/ebook). xix, 443 p. (2016).

This textbook is intended for students studying the foundations of mathematics and mathematical proofs, and presents mathematical logic and set theory in an extent suitable to prepare them for more advanced courses. It can conventionally be divided into three parts: mathematical logic (two chapters), set theory with applications (four chapters), and model theory (one chapter). In the first part, the logical languages, rules of inference and proof methods of both propositional and first-order logic are explained, also consistency, soundness and completeness proofs for propositional logic are presented. Attention to formalization of sentences of the natural language is paid to a lesser degree. The set theory part includes chapters on the elementary theory of sets, relations and functions, axiomatic set theory (ZF, axioms of choice and regularity, construction of integers, rational and real numbers, mathematical induction), and ordinals and cardinals (equinumerosity, arithmetic, large cardinals). In the model theory chapter, an account is given of first-order semantics with consistency, soundness and completeness proofs, applications to abstract algebra (groups, rings, concepts of substructure and homomorphism) and models of different cardinality (Peano arithmetic, compactness, Löwenheim-Skolem theorems, von Neumann hierarchy; Gödel's incompleteness theorems only stated). A peculiarity of the book is that it contains numerous examples, which illustrate most definitions, theorems and constructions. Every section is equipped with exercises of varying degree of difficulty, and many useful results are presented in this form. The textbook can serve as a basis for introductory courses both in mathematical logic and set theory. The reviewer also agrees to the publisher's note that it is "appropriate for upper-undergraduate transition courses with rigorous mathematical reasoning involving algebra, number theory, or analysis." *Jānis Cīrulis (Riga)*

Classification: E35 E65
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