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Logic and Structure

Universitext

This book provides an efficient introduction to logic students of mathematics. The central theme is that part of first order logic which can be handled directly on the basis of **derivation** and **validity.** Emphasis is placed on notions that play a role in every-day mathematics, such as models, truth, relativized quantifiers, consistency, Skolem functions, and extension by definition. Following a self-contained presentation of propositional logic (including completeness), predicate logic – with applications to elementary algebra – is treated systematically, leading to an exposition of the first principles of model theory. A unique feature of this book is the systematic use of Gentzen's system of **Natural Deduction.** Closer to natural informal reasoning than an axiomatic approach, it enables the student to devise derivations as a simple exercise. Inductive definitions have been employed wherever appropriate. Model-theoretic topics include the main facts of compactness, non-standard models of arithmetic and the reals, and, in a special section, some of the properties of second-order logic. The material is illustrated by many exercises and demands a minimum background in mathematics of the reader.