Tatra Mt. Math. Publ. **25** (2002), 137–138

TATRA MOUNTAINS
Mathematical Publications

BOOK REVIEW

Nievergelt, Y.: FOUNDATIONS OF LOGIC AND MATHEMATICS. Applications to Computer Science and Cryptography. Birkhäuser, Boston 2002, xii, 415 p. EUR 90.00; sFR. 136.00., ISBN 0-8176-4249-8.

The book gives the introduction to the foundations of logic and mathematics and computer science. There are considered the following issues and questions: why the truth table for logical implication is so unintuitive, why there are no recipes to design proofs, what issues in logic, mathematics, and computer science still remain unresolved.

The book treats not only theory, but also in some details applications that have substantial impact on everyday life - for example, financial loans and mortgages, bar codes (Universal Product Codes), public-key cryptography (Rives-Shamir-Adelman codes), and transportation networks.

There are covered the following topics: truth tables, propositional and predicate calculi, set theory, theory and practice of basic arithmetic, cardinality, well-formed sets, completeness and incompleteness of various logic, number theory, combinatorics, and graph theory. One of the key strengths of the presentation is the continuous thread from theory to applications. So a material that is necessary for logical coherence is found here.

The book consists of Preface, Outline and two main parts: A—Theory and B—Applications.

The part A is divided into sections: 0 Boolean Algebraic Logic, 1 Logic and Deductive Reasoning, 2 Set Theory, 3 Induction, Recursion, Arithmetic, Cardinality, 4 Decidability and Completeness.

The part B is divided into sections: 5 Number Theory and Codes, 6 Ciphers, Combinatorics, and Probabilities, 7 Graph Theory.

Every section ends with Projects, where some extensions of the preceding results are formulated.

This book is both a text and a reference. It is the material convenient for undergraduate courses for students majoring in mathematics, computer science or computer information systems including students majoring in philosophy or mathematical education.

It also serves as an excellent self-study reference and resource for instructors of courses in the above-mentioned areas.

There are some misprints. The most interesting one is in connection with Example 579, p. 196. This does not impair the quality of the book.

There is plenty of exercises (over 1000) in this book.

It is interesting and valuable that every chapter begins with a suggestive figure.

The figures bring life to the text with many formulas.

Miloslav Duchoň, Bratislava