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Decidable and Undecidable Problems -- 33 Reduction -- 34 Rice’s Theorem -- 35 Undecidable Problems About CFLs -- 36 Other Formalisms -- 37 The a-Calculus -- I While Programs -- J Beyond Undecidability -- 38 Gödel’s Incompleteness Theorem -- 39 Proof of the Incompleteness Theorem -- K Gödel’s Proof -- Exercises -- Homework Sets -- Homework 1 -- Homework 2 -- Homework 3 -- Homework 4 -- Homework 5 -- Homework 6 -- Homework 7 -- Homework 8 -- Homework 9 -- Homework 10 -- Homework 11 -- Homework 12 -- Miscellaneous Exercises -- Finite Automata and Regular Sets -- Pushdown Automata and Context-Free Languages -- Turing Machines and Effective Computability -- Hints and Solutions -- Hints for Selected Miscellaneous Exercises -- Solutions to Selected Miscellaneous Exercises -- References -- Notation and Abbreviations.

Sommario/riassunto

The aim of this textbook is to provide undergraduate students with an introduction to the basic theoretical models of computability, and to develop some of the model's rich and varied structure. Students who have already some experience with elementary discrete mathematics will find this a well-paced first course, and a number of supplementary chapters introduce more advanced concepts. The first part of the book is devoted to finite automata and their properties. Pushdown automata provide a broader class of models and enable the analysis of context-free languages. In the remaining chapters, Turing machines are introduced and the book culminates in discussions of effective computability, decidability, and Gödel's incompleteness theorems. Plenty of exercises are provided, ranging from the easy to the challenging. As a result, this text will make an ideal first course for students of computer science.