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Computability, Complexity, and Languages John Wiley & Sons
An introduction to a rapidly developing topic: the theory of quantum computing. Following the basics of classical theory of computation, the book provides an exposition of quantum computation theory. In concluding sections, related topics, including parallel quantum computation, are discussed.

Elements of Computation Theory MIT Press

The P-NP problem is the most important open problem in computer science, if not all of mathematics. Simply stated, it asks whether every problem whose solution can be quickly checked by computer can also be quickly solved by computer. The Golden Ticket provides a nontechnical introduction to P-NP, its rich history, and its algorithmic implications for everything we do with computers and beyond. Lance Fortnow traces the history and development of P-NP, giving examples from a variety of disciplines, including economics, physics, and biology. He explores problems that capture the full difficulty of the P-NP dilemma, from discovering the shortest route through all the rides at Disney World to finding large groups of friends

on Facebook. The Golden Ticket explores what we truly can and cannot achieve computationally, describing the benefits and unexpected challenges of this compelling problem.

Introduction to the Theory of Computation Cambridge University Press

This introductory text covers the key areas of computer science, including recursive function theory, formal languages, and automata. Additions to the second edition include: extended exercise sets, which vary in difficulty; expanded section on recursion theory; new chapters on program verification and logic programming; updated references and examples throughout.

Understanding Machine Learning Prentice Hall PTR

Takes students and researchers on a tour through some of the deepest ideas of maths, computer science and physics.

Classical and Quantum Computation Springer Science & Business Media

Automata and natural language theory are topics lying at the heart of computer science. Both are linked to computational complexity and together, these disciplines help define the parameters of what constitutes a computer, the structure of programs, which problems are solvable by computers, and a range of other crucial aspects of the practice of computer science. In this important volume, two respected authors/editors in the field offer accessible, practice-oriented coverage of these issues with an emphasis on refining core problem solving skills.

Formal Languages and Automata Theory American Mathematical Soc.

An introduction to computational complexity theory, its connections and interactions with mathematics, technology, and philosophy Mathematics and Computation provides a broad, conceptual overview of computational complexity theory—the mathematical study of efficient computation. With important practical applications to computer science and industry, computational complexity theory has evolved into a highly interdisciplinary field, with strong links to most mathematical areas and to a growing number of scientific endeavors. Avi Wigderson takes a sweeping survey of complexity theory, emphasizing the field's insights and challenges. He explains the ideas and motivations leading to key models, notions, and results. In particular, he looks at algorithms and complexity, computations and proofs, randomness and interaction, quantum and arithmetic computation, and cryptography and learning, all as parts of a cohesive whole with numerous cross-influences. Wigderson illustrates the immense breadth of the field, its beauty and richness, and its diverse and growing interactions with other areas of mathematics. He ends with a comprehensive look at the theory of computation, its methodology and aspirations, and the unique and fundamental ways in which it has

shaped and will further shape science, technology, and society. For further reading, an extensive bibliography is provided for all topics covered. Mathematics and Computation is useful for undergraduate and graduate students in mathematics, computer science, and related fields, as well as researchers and teachers in these fields. Many parts require little background, and serve as an invitation to newcomers seeking an introduction to the theory of computation. Comprehensive coverage of computational complexity theory, and beyond High-level, intuitive exposition, which brings conceptual clarity to this central and dynamic scientific discipline Historical accounts of the evolution and motivations of central concepts and models A broad view of the theory of computation's influence on science, technology, and society Extensive bibliography

Automata and Computability Cambridge University Press
The foundation of computer science is built upon the following questions: What is an algorithm? What can be computed and what cannot be computed? What does it mean for a function to be computable? How does computational power depend upon programming constructs? Which algorithms can be considered feasible? For more than 70 years, computer scientists are searching for answers to such questions. Their ingenious techniques used in answering these questions form the theory of computation. Theory of computation deals with the most fundamental ideas of computer science in an abstract but easily understood form. The notions and techniques employed are widely spread across various topics and are found in almost every branch of computer science. It has thus become more than a necessity to revisit the foundation, learn the techniques, and apply them with confidence. Overview and Goals This book is about this solid, beautiful, and pervasive foundation of computer science. It introduces the fundamental notions, models, techniques, and results that form the basic paradigms of computing. It gives an introduction to the concepts and mathematics that computer scientists of our day use to model, to argue about, and to predict the behavior of algorithms and computation. The topics chosen here have shown

remarkable persistence over the years and are very much in current use.
Understanding Analysis Springer Science & Business Media

These are my lecture notes from CS381/481: Automata and Computability Theory, a one-semester senior-level course I have taught at Cornell University for many years. I took this course myself in the fall of 1974 as a first-year Ph.D. student at Cornell from Juris Hartmanis and have been in love with the subject ever since. The course is required for computer science majors at Cornell. It exists in two forms: CS481, an honors version; and CS381, a somewhat gentler paced version. The syllabus is roughly the same, but CS481 goes deeper into the subject, covers more material, and is taught at a more abstract level. Students are encouraged to start off in one or the other, then switch within the first few weeks if they find the other version more suitable to their level of mathematical skill. The purpose of the course is twofold: to introduce computer science students to the rich heritage of models and abstractions that have arisen over the years; and to develop the capacity to form abstractions of their own and reason in terms of them.

Algorithmic Number Theory: Efficient algorithms Pearson College Division

Data Structures & Theory of Computation

Computability and Complexity Theory PHI Learning Pvt. Ltd.

This classic book on formal languages, automata theory, and computational complexity has been updated to present theoretical concepts in a concise and straightforward manner with the increase of hands-on, practical applications. This new edition comes with Gradiance, an online assessment tool developed for computer science. Please note, Gradiance is no longer available with this book, as we no longer support this product.

Introducing the Theory of Computation Jones & Bartlett Publishers

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Introduction to Automata Theory, Languages, and Computation Princeton University Press

Learn the skills and acquire the intuition to assess the theoretical limitations of computer programming Offering an accessible approach to the topic, Theory of Computation focuses on the metatheory of computing and the theoretical boundaries between what various computational models can do and not do—from the most general model, the URM (Unbounded Register Machines), to the finite automaton. A wealth of programming-like examples and easy-to-follow explanations build the general theory gradually, which guides readers through the modeling and mathematical analysis of computational phenomena and provides insights on what makes things tick and also what restrains the ability of computational processes. Recognizing the importance of acquired practical experience, the book begins with the metatheory of general purpose computer programs, using URMs as a straightforward, technology-independent model of modern high-level programming languages while also exploring the restrictions of the URM language. Once readers gain an understanding of computability theory—including the primitive recursive functions—the author presents automata and languages, covering the regular and context-free languages as well as the machines that recognize these languages. Several advanced topics such as reducibilities, the recursion theorem, complexity theory, and Cook's theorem are also discussed. Features of the book include: A review of basic discrete mathematics, covering logic and induction while omitting specialized combinatorial topics A thorough development of the modeling and mathematical analysis of computational phenomena, providing a solid foundation of un-computability The connection between un-computability and un-provability: Gödel's first incompleteness theorem The book provides numerous examples of specific URMs as well as other programming languages including Loop Programs, FA (Deterministic Finite Automata), NFA (Nondeterministic Finite Automata), and PDA (Pushdown Automata). Exercises at the end of each chapter allow readers to test their comprehension of the presented material, and an extensive bibliography suggests resources for further study. Assuming only a basic understanding of general computer programming and discrete mathematics, Theory of Computation serves as a valuable book for courses on theory of computation at the upper-undergraduate level. The book also serves as an excellent resource for programmers and computing professionals wishing to understand the theoretical limitations of their craft.

The Golden Ticket MIT Press
Volume 1.

Student Solutions Manual for Numerical Analysis Pearson Education India

In this book, which was originally published in 1985, Arto Salomaa gives an introduction to certain mathematical topics central to theoretical computer science: computability and recursive functions, formal languages and automata, computational complexity and cryptography.

Introduction to the Theory of Complexity Springer Science & Business Media

This textbook is uniquely written with dual purpose. It covers core material in the foundations of computing for graduate students in computer science and also provides an introduction to some more advanced topics for those intending further study in the area. This innovative text focuses primarily on computational complexity theory: the classification of computational problems in terms of their inherent complexity. The book contains an invaluable collection of lectures for first-year graduates on the theory of computation. Topics and features include more than 40 lectures for first-year graduate students, and a dozen homework sets and exercises.

Automata, Computability and Complexity Pearson Education India

This elementary presentation exposes readers to both the process of rigor and the rewards inherent in taking an axiomatic approach to the study of functions of a real variable. The aim is to challenge and improve mathematical intuition rather than to verify it. The philosophy of this book is to focus attention on questions which give analysis its inherent fascination. Each chapter begins with the discussion of some motivating examples and concludes with a series of questions.

Mathematics and Computation Cambridge University Press

Provides an introduction to the theory of computation that emphasizes formal languages, automata and abstract models of computation, and computability. This book also includes an introduction to computational complexity and NP-completeness.

Computation and Automata Academic Press

Taking a practical approach, this modern

introduction to the theory of computation focuses on the study of problem solving through computation in the presence of realistic resource constraints. The Theory of Computation explores questions and methods that characterize theoretical computer science while relating all developments to practical issues in computing. The book establishes clear limits to computation, relates these limits to resource usage, and explores possible avenues of compromise through approximation and randomization. The book also provides an overview of current areas of research in theoretical computer science that are likely to have a significant impact on the practice of computing within the next few years.

Computability and Logic Addison Wesley

"Intended as an upper-level undergraduate or introductory graduate text in computer science theory," this book lucidly covers the key concepts and theorems of the theory of computation. The presentation is remarkably clear; for example, the "proof idea," which offers the reader an intuitive feel for how the proof was constructed, accompanies many of the theorems and a proof. Introduction to the Theory of Computation covers the usual topics for this type of text plus it features a solid section on complexity theory--including an entire chapter on space complexity. The final chapter introduces more advanced topics, such as the discussion of complexity classes associated with probabilistic algorithms.

Theory of Computation Oxford University Press

This fifth edition of 'Computability and Logic' covers not just the staple topics of an intermediate logic course such as Godel's incompleteness theorems, but also optional topics that include Turing's theory of computability and Ramsey's theorem.