On-sale
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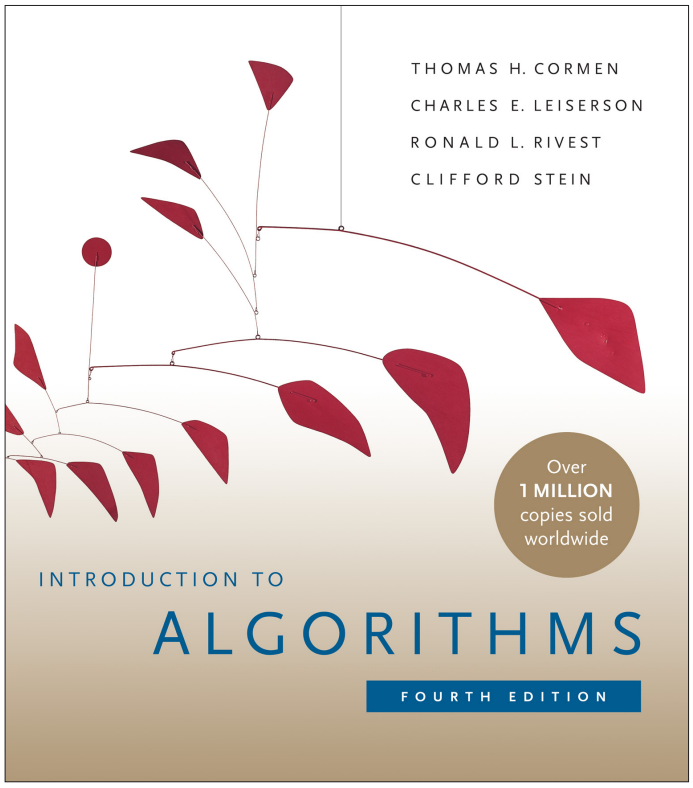

Global Changes

- **140 new exercises, 22 new problems, and improved versions of other exercises and problems**
- **Color has been added throughout to enhance readability, highlight defined terms and pseudocode comments.**
- **A focus on clearer, more personal, and gender-neutral writing**
- **Updated code from Java to Python**

Organizational Changes

3 New Chapters

- **Chapter 25: Matchings in Bipartite Graphs**
- **Chapter 27: Online Algorithms**
- **Chapter 33: Machine-Learning Algorithms**

Moved Online

- *Chapter 19* **Fibonacci Heaps**, *Chapter 20* **van Emde Boas Trees**, and *Chapter 33* **Computational Geometry**.
- Material on the maximum-subarray problem [Section 4.1], implementing pointers and objects [Section 10.3], perfect hashing [Section 11.5], randomly built binary search trees [Section 12.4], matroids [Sections 16.4, 16.5], push-relabel algorithms for maximum flow [Section 26.4, 26.5], the iterative fast Fourier transform method [part of Section 30.0], the details of the simplex algorithm for linear programming [in Section 29.3, 29.5], and integer factorization [Section 31.9].

Content Changes

Chapter 3 **Growth of Functions**: Renamed "Characterizing Running Times" and added a section giving an overview of asymptotic notation before delving into the formal definitions

Chapter 4 **Divide and Conquer**: Substantially changed to improve its mathematical foundation and make it more robust and intuitive

- Algorithmic recurrence introduced, and topic of ignoring floors and ceilings in recurrences addressed more rigorously
- Second case of the master theorem incorporates polylogarithmic factors, and a rigorous proof of a "continuous" version of the master theorem now provided
- Now presents the powerful and general Akra-Bazzi method (without proof)

Chapter 9 **Medians and Order Statistics**: Deterministic order-statistic algorithm is different, and analyses of randomized and deterministic order-statistic algorithms are revamped

Chapter 10 **Elementary Data Structures**: Section 10.1 discusses ways to store arrays and matrices

Chapter 11 **Hash Tables**: Includes modern treatment of hash functions and emphasizes linear probing as an efficient method for resolving collisions when the underlying hardware implements caching to favor local searches

Chapter 15 **Greedy Algorithms**: Replaced sections on matroids, converted a problem in the third edition about offline caching into a full section

Chapter 16 **Amortized Analysis**: Section 16.4 now contains a more intuitive explanation of the potential functions to analyze table doubling and halving

Chapter 17 **Augmenting Data Structures**: Relocated from Part III to Part V, reflecting the authors' view that this technique goes beyond basic material

NEW *Chapter 25* **Matchings in Bipartite Graphs**: Presents algorithms to find a matching of maximum cardinality, to solve the stable-marriage problem, and to find a maximum-weight matching (known as the "assignment problem")

Chapter 26 **Parallel Algorithms**: Updated with modern terminology, including the name of the chapter

NEW *Chapter 27* **Online Algorithms**: Describes several examples of online algorithms, including determining how long to wait for an elevator before taking the stairs, maintaining a linked list via the move-to-front heuristic, and evaluating replacement policies for caches

Chapter 29 **Linear Programming**: Removed the detailed presentation of the simplex algorithm. The chapter now focuses on the key aspect of how to model problems as linear programs, along with the essential duality property of linear programming

Chapter 32 **String Matching**: Section 32.5 adds to the chapter on string matching the simple, yet powerful, structure of suffix arrays

NEW *Chapter 33* **Machine-Learning Algorithms**: Introduces several basic methods used in machine learning: clustering to group similar items together, weighted-majority algorithms, and gradient descent to find the minimizer of a function

Chapter 34 **NP-Completeness**: Section 34.5.6 summarizes strategies for polynomial-time reductions to show that problems are NP-hard

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