### 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”).

**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.

**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.

**NEW Chapter 29 Linear Programming:** Section 29.5 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.

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

### 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].