

## Lecture 15- sorting algorithms

1. Which sorting algorithm involves dividing the array into subsections, sorting each, then merging them back?

- A. Insertion Sort
- B. Selection Sort
- C. Merge Sort
- D. Bucket Sort

Answer: C. Merge Sort

2. Specialized sorts (e.g., Bucket Sort) typically achieve a runtime of:

- A.  $O(n^2)$
- B.  $O(n \log n)$
- C.  $O(n)$
- D.  $O(\log n)$

Answer: C.  $O(n)$

3. A stable sorting algorithm preserves the relative order of:

- A. All elements
- B. Elements with unique keys
- C. Elements with equal keys
- D. The first and last elements

Answer: C. Elements with equal keys

4. Which of the following is a stable sorting algorithm?

- A. Quick Sort
- B. Heap Sort
- C. Insertion Sort
- D. Selection Sort

Answer: C. Insertion Sort

5. Insertion Sort's best-case time complexity is:

- A.  $O(n)$
- B.  $O(n \log n)$
- C.  $O(n^2)$
- D.  $O(1)$

Answer: A.  $O(n)$

6. Selection Sort is not stable because:

- A. It uses divide-and-conquer
- B. It swaps non-adjacent elements
- C. It requires extra memory
- D. It has a quadratic runtime

Answer: B. It swaps non-adjacent elements

7. The worst-case time complexity of Merge Sort is:

- A.  $O(n)$
- B.  $O(n \log n)$
- C.  $O(n^2)$
- D.  $O(\log n)$

Answer: B.  $O(n \log n)$

8. Quick Sort's performance heavily depends on:

- A. The programming language used
- B. The choice of pivot
- C. The number of elements
- D. The stability of the algorithm

Answer: B. The choice of pivot

9. Which sorting algorithm uses the "divide and conquer" principle?

- A. Insertion Sort
- B. Quick Sort
- C. Bubble Sort
- D. Selection Sort

Answer: B. Quick Sort

10. Heap Sort's worst-case time complexity is:

- A.  $O(n)$
- B.  $O(n \log n)$
- C.  $O(n^2)$
- D.  $O(\log n)$

Answer: B.  $O(n \log n)$

11. Bucket Sort is most efficient when the input is:

- A. Reverse-sorted
- B. Uniformly distributed
- C. Already sorted
- D. Contains many duplicates

Answer: B. Uniformly distributed

12. Radix Sort processes digits from:

- A. Most significant to least significant
- B. Least significant to most significant
- C. Middle to edges
- D. Randomly

Answer: B. Least significant to most significant

13. Which algorithm is in-place and not stable?

- A. Merge Sort
- B. Insertion Sort
- C. Quick Sort
- D. Radix Sort

Answer: C. Quick Sort

14. The worst-case time complexity of Insertion Sort is:

- A.  $O(n)$
- B.  $O(n \log n)$
- C.  $O(n^2)$
- D.  $O(1)$

Answer: C.  $O(n^2)$

15. Which algorithm uses a pivot element?

- A. Merge Sort
  - B. Quick Sort
  - C. Heap Sort
  - D. Bucket Sort
- Answer: B. Quick Sort

17. Which sorting algorithm is equivalent to building a binary search tree?
- A. Heap Sort
  - B. Quick Sort
  - C. Insertion Sort
  - D. Selection Sort
- Answer: B. Quick Sort

19. Which algorithm is not a comparison sort?
- A. Quick Sort
  - B. Radix Sort
  - C. Merge Sort
  - D. Heap Sort
- Answer: B. Radix Sort

20. Which algorithm is stable,  $O(n \log n)$ , but not in-place?
- A. Merge Sort
  - B. Insertion Sort
  - C. Quick Sort
  - D. Selection Sort
- Answer: A. Merge Sort