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