CRASH COURE 2025

DS & AI

Algorithms

DPP

divide and Conquer

Q1 Assume that there are 4n sorted list of size $\frac{n}{2}$, then what is the time complexity of merging them into single sorted list

(A) $\theta(n^2 \log n)$

(B) (log n)

(C) $\theta(n\log n)$

(D) $\theta(n^2)$

Q2 Assume that, quick sort implementation is used to sort an array in ascending order after the first partition step has been completed, the contents of the array are in the following order. 50 30 40 20 80 90 120 100 140 110 160

Which of the following elements could be a pivot element?

(A) 40 (B) 30

(C) 80 (D) 160

Q3 Assume that a binary search is used to search for a particular key within a sorted array of 256 values then what is the maximum number of key comparisons, the program. Would require to make before finding the key _____.

Q4 Choose the correct statements from the following statements

(A) Binary search in an unsorted array will take O(nlogn) time in worst case.

(B) Searching for an element in an unsorted array will take O(n) time in the worst case.

(C) Binary search on a sorted linked list takes O(n) time in worst case.

(D) Applying binary search on sorted linked list takes O(logn) time in worst case.

Q5 What is the auxiliary space complexity of merge sort

(A) O(1) (B) O(logn)

(C) O(n) (D) O(nlog)

Q6 Generally, merge is a divide and conquer technique which can also be implemented in a recursive manner. If there are 200 elements in an array then find the exact number of merge sort function calls which will perform the recursive call_____.

Q7 Consider the following code segment

```
int a, b, n;
for (a = 1; a ≤ 1; a++)
  {
  for (b = 1; b< = a; b++)
    {
     printf ("GATEWALLAH");
    }
}
```

Which of the following statements is/are true?

(A) If f(n) is the number of times "GATEWALLAH" printed in terms of n, then f(n) is equivalent to n

(B) If f(n) is the number of times "GATEWALLA" is printed in terms of n then f(n) is equivalent to n – 1

(C) Time complexity of the given code is $\theta(n)$

(D) Time complexity of the given code is $\theta(n^2)$

Q8 Consider a variation of merge sort in which we divide the list into 3 sub lists of equal size, recursively sorting each list, and then merging

the three lists to get the final sorted list.
What is the recurrence relation that is required for the number of comparisons used by this algorithm in worst case?
(NOTE: Assume that the number of elements to be sorted is a power of 3 so that all of the divisions are into three sub lists workout evenly)
(A) $T(n) = 3T(n/3) + n - 1$
(B) $T(n) = 2T(n/2) + n - 1$
(C) $T(n) = 6T(n/3) + n - 1$
(D) None of these

Q9 Consider a list which contains 2^n sorted lists each of size n and is merged using merge sort, then what is the tightest upper bound worst case complexity?
(A) $O(n^2 2^n)$ (B) $O(2^n \log n)$
(C) $O(n.2n)$ (D) None of these

Q10 Let's suppose you are given an array in which, the few elements in the beginning are present in ascending order and remaining elements are in descending order, then what is the complexity of most efficient algorithm to find the maximum value of this array?
(A) $\theta(n \log n)$
(B) $\theta(n)$
(C) $O(1)$
(D) $\theta(\log n)$

Answer Key

Q1	(A)
Q2	(C, D)
Q3	8
Q4	(A, B, C)
Q5	(C)
Q6	398
Q7	(D)
Q8	(A)
Q9	(A)
Q10	(D)