DATA STRUCTURES AND ALGORITHM ANALYSIS

Surprise Test

Rajdeep Jaiswal

Final Grade
Submitted 2/23/22, 9:25 PM (UTC+5:30)

12 / 12

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Question 1

How many times is 'a' printed when the following C code is executed?

```
#include<stdio.h>
main()
{
 int a;
 a=f1(10);
 printf("%d",a);
}
f1(int b)
{
 if(b==0)
 return 0;
 else
 {
 printf("a");
 f1(b--);
 }
}
```

A 9 times

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```
f1(int b)
{
 if(b==0)
 return 0;
 else
 {
 printf("a");
 f1(b--);
 }
}
```

A 9 times

B 10 times

C 0 times

D Infinite number of times

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Question 2

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Question 2

What is the time complexity of recursive function given below:
T(n)= 4T(n/2) + n^2

(A) O(n^2)

(B) O(n)

(C) **O(n^2 log n)**

(D) O(n log n)

Question 3

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Question 3

Which of the following data structures is useful in traversing a given graph by breadth first search?

- (A) Stack
- (B) Queue
- (C) List
- (D) None of the above.

Question 4

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Question 4

The tightest lower bound on the number of comparisons, in the worst case, for comparison-based sorting is of the order of

- (A) N
- (B) N^2
- (C) **NlogN**
- (D) N(logN)^2

Question 5

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Question 5

Which sorting algorithms is most efficient to sort string consisting of ASCII characters?

- (A) Quick sort
- (B) Heap sort
- (C) Merge sort
- (D) **Counting sort**

Question 6

The best data structure to check whether an arithmetic expression has balanced parenthesis is a

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12 / 12

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Question 6

The best data structure to check whether an arithmetic expression has balanced parenthesis is a

- (A) Queue
- (B) Tree
- (C) **Stack**
- (D) List

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Question 7

Which of the following problems can't be solved using recursion?

- (A) Factorial of a number
- (B) Nth fibonacci number
- (C) Length of a string
- (D) **Problems without base case**

Question 8

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12 / 12

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Question 8

Assume that the algorithms considered here sort the input sequences in ascending order. If the input is already in ascending order, which of the following are **TRUE**?

I. Quicksort runs in Θ(n^2) time
II. Bubblesort runs in Θ(n*2) time
III. Mergesort runs in Θ(n) time
IV. Insertion sort runs in Θ(n) time

(A) I and II only

(B) I and III only

(C) II and IV only

(D) I and IV only

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12 / 12

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Question 9

Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this:
2 5 1 7 9 12 11 10
Which statement is correct?

- (A) **The pivot could be either the 7 or the 9.**
- (B) The pivot could be the 7, but it is not the 9
- (C) The pivot is not the 7, but it could be the 9
- (D) Neither the 7 nor the 9 is the pivot.

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Question 10

Given a binary max heap. The elements are sorted in an array as 25,14, 16,13,10,8,12. What is the content of array after two delete operation?

A 14,13,8,12,10

B 14,12,13,10,8

C **14,13,12,8,10**

D 14,13,12,10,8

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Question 11

Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this: 16 14 15 10 12 27 28 How many heapify operations have been performed on root of heap?

- (A) 1
- (B) 2
- (C) 3 or 4
- (D) 5 or 6

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Question 12

Given an unsorted array. The array has this property that every element in array is at most k distance from its position in sorted array where k is a positive integer smaller than size of array. Which sorting algorithm can be easily modified for sorting this array and what is the obtainable time complexity?

(A) Insertion Sort with time complexity O(kn)

(B) **Heap Sort with time complexity O(nLogk)**

(C) Quick Sort with time complexity O(kLogk)

(D) Merge Sort with time complexity O(kLogk)

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