

This contest is open for practice, you can submit and practice questions, if you attempted the contest you can view your submissions by clicking on "Reveal Answers Button"

QUESTION 1

Marks Scored: +5

Correct Answer: +5 Marks

A list of  $n$  strings, each of length  $n$ , is sorted into lexicographic order using the merge-sort algorithm. The worst case running time of this computation is

☐  $O(n \log n)$

☐  $O(n^2 + \log n)$

☒  $O(n^2 \log n)$

☐  $O(n^2)$

What will the output of the below code?

C/C++ Code

```
#include <iostream>
using namespace std;

int main()
{
    int arr[2] = { 1, 2 };
    cout << 0 [arr] << ", " << 1 [arr] << endl;
    return 0;
}
```

C/C++ Code

```
public class Main {
    public static void main(String[] args) {
        int[] arr = {1, 2};
        System.out.println(arr[0] + ", " + arr[1]);
    }
}
```

☒ 1, 2

☐ Syntax error

☐ Run time error

☐ None

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QUESTION 3

Marks Scored: +0

Correct Answer: +0 Marks

The average number of key comparisons done in a successful sequential search in a list of length  $n$  is

☐  $\log n$

☐  $(n-1)/2$

☐  $n/2$

☒  $(n+1)/2$

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QUESTION 4

Marks Scored: +5

Correct Answer: +5 Marks

A matrix  $M(3 \times 5)$  is to be stored in column-major order in a computer. If the base address of the matrix is 1000 and the size of each element is 4 bytes, then what will be the address of  $M(2, 3)$ ?

- (A) 1028
- (B) 1188
- (C) 1204
- (D) 1220

☐ 1028

☐ 1188

☒ 1204

☐ 1220

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QUESTION 5

Marks Scored: +5

Correct Answer: +5 Marks

Which of the following operations cannot be performed using bitwise operators?

☐ Division

☒ Modulus

☐ Left Shift

☐ Right Shift

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QUESTION 6

Marks Scored: +5

Correct Answer: +5 Marks

A program P reads in 500 integers in the range [0..100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies?

☒ An array of 50 numbers

☐ An array of 100 numbers

☐ An array of 500 numbers

☐ A dynamically allocated array of 550 numbers

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QUESTION 7

Marks Scored: +5

Correct Answer: +5 Marks

Which of the following bitwise operations will always return a bitwise complement of x for any given unsigned integer x?

☐  $x \wedge (x \& (\sim x))$

☐  $x \& (x | (\sim x))$

☐  $x | (x \& (\sim x))$

☒  $x \wedge (x | (\sim x))$

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QUESTION 8

Marks Scored: +5

Correct Answer: +5 Marks

Let  $A$  be a square matrix of size  $n \times n$ . The maximum number of elements that can be nonzero in a row of  $A$  without causing an overflow is  $2^p$ . What is the minimum possible value of  $p$ ?

☒  $\log_2(n)$

☐  $\log_2(n/2)$

☐  $\log_2(n-1)$

☐  $\log_2(n+1)$



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QUESTION 9

Marks Scored: +5

Correct Answer: +5 Marks

The minimum number of comparisons required to determine if an integer appears more than  $n/2$  times in a sorted array of  $n$  integers is

☐  $\Theta(n)$

☒  $\Theta(\log n)$

☐  $\Theta(n \cdot \log n)$

☐  $\Theta(1)$

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QUESTION 10

Marks Scored: +5

Correct Answer: +5 Marks

Let  $A$  be a square matrix of size  $n \times n$ . Consider the following program. What is the expected output?

```
C = 100
for i = 1 to n do
  for j = 1 to n do
  (
    Temp = A[i][j] + C
    A[i][j] = A[j][i]
    A[j][i] = Temp - C
  )
for i = 1 to n do
  for j = 1 to n do
    Output(A[i][j]);
```

☒ The matrix  $A$  itself

☐ Transpose of matrix  $A$

☐ Adding 100 to the upper diagonal elements and subtracting 100 from diagonal elements of  $A$

☐ None of the above