

✓ \*

Let  $X$  be a square matrix. Consider the following two statements on  $X$ .

- I.  $X$  is invertible.
- II. Determinant of  $X$  is non-zero.

Which one of the following is TRUE?

- I implies II, II does not imply I
- II implies I, I does not imply II
- I does not imply II, neither II imply I
- I and II are equivalent.

✓ What will be the output? \*

```
#include <stdio.h>
int jumble(int x, int y){
    x=2*x+y;
    return x;
}
int main(){
    int x=2, y=5;
    y=jumble(y,x);
    x=jumble(y,x);
    printf("%d \n", x);
    return 0;
}
```

- 12
- 16
- 26
- 13

✓ Which of the statements are true? \*

2/2

Consider the following statements:

- I. The smallest element in a max-heap is always at a leaf node
- II. The second largest element in a max-heap is always a child of the root node
- III. A max-heap can be constructed from a binary search tree in  $\Theta(n)$  time
- IV. A binary search tree can be constructed from a max-heap in  $\Theta(n)$  time

I, II, III



I, II, IV

I, III, IV

II, III, IV

✓ What is the output of the following program? \*

2/2

```
#include <stdio.h>

int counter = 0;

int calc (int a, int b) {
    int c;

    counter++;
    if (b==3) return (a*a*a);
    else {
        c = calc(a, b/3);
        return (c*c*c);
    }
}

int main () {
    calc(4, 81);
    printf ("%d", counter);
}
```

- 4
- 8
- 27
- 64



✓ \*

2/2

Consider the following program written in pseudo-code. Assume that x and y are integers:

```
Count (x, y) {  
    if (y != 1) {  
        if (x != 1) {  
            print("*");  
            Count (x/2, y);  
        }  
        else {  
            y = y - 1;  
            Count (1024, y);  
        }  
    }  
}
```

The number of times that the print statement is executed by the call Count (1024, 1024) is

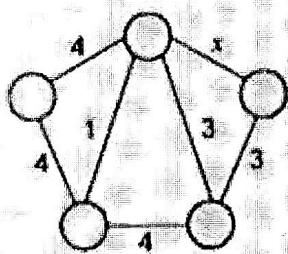
- 10
- 100
- 10230
- 10240

✓

2/2



Consider the following undirected graph G:



Choose a value of  $x$  that will maximize the number of minimum weight spanning trees (MWSTs) of G. The number of MWSTs of G for this value of  $x$  is \_\_\_\_\_.

- 1
- 2
- 3
- 4



✓ What is the condition for two elements  $A[i]$  and  $A[j]$  to form an inversion? 2/2

\*

- $A[i] < A[j]$
- $i < j$
- $A[i] < A[j]$  and  $i < j$
- $A[i] > A[j]$  and  $i < j$

✓

✓ How many inversions are there in the array  $A = \{1, 5, 4, 2, 3, 7, 6\}$ ? \*

2/2

- 3
- 4
- 5
- 6

✓

- ✓ What is the time complexity of the following code that determines the number of inversions in an array? \*

```
int InvCount(int arr[], int n)
{
    int count = 0;
    for (int i = 0; i < n - 1; i++)
        for (int j = i + 1; j < n; j++)
            if (arr[i] > arr[j])
                count++;

    return count;
}
```

- O(n)
- O(n log n)
- O( $n^2$ )
- O(log n)



✓ What is the worst case time complexity of a quick sort algorithm? \*

2/2

$O(N)$

$O(N \log N)$

$O(N^2)$

✓

$O(\log N)$

✓ Which of the following methods is the most effective for picking the pivot element in Quicksort? (Use a small array for example and find.) \*

2/2

Random element

Median of 3 partitioning

✓

First element

Last element

2/2

- ✓ MISSISSIPPI has been encoded in the following way (image shown below). Is this an optimal solution? Find the ABL. \*

Character	Frequency	Code	Code Length
m	1	100	3
p	2	101	3
s	4	11	2
i	4	0	1

Yes, 2

Yes 1.9 ✓

No, 2

No, 1.9

✓ Which is optimal value in the case of job sequence problem Item : 1 2 3 4 2/2  
5. Profit : 20 15 10 5 1 Deadline : 2 2 3 3 3 \*

1,2,4

1,3,4

4,2,3

1,5,2

