

**Started on** Thursday, 17 March 2022, 4:22 PM

**State** Finished

**Completed on** Thursday, 17 March 2022, 4:29 PM

**Time taken** 7 mins 29 secs

## Question

# 1

Complete

Marked out of  
1.00

A Binary Search Tree (BST) stores values in the range 37 to 573. Consider the following sequence of keys.

I. 81, 537, 102, 439, 285, 376, 305

II. 52, 97, 121, 195, 242, 381, 472

III. 142, 248, 520, 386, 345, 270, 307

IV. 550, 149, 507, 395, 463, 402, 270

Which of the following statements is TRUE?

Select one:

- ☐ a. IV is a postorder sequence of some BST with 149 as the root
- ☒ b. II is an inorder sequence of some BST where 121 is the root and 52 is a leaf
- ☐ c. I is a preorder sequence of some BST with 439 as the root
- ☐ d. I, II and IV are inorder sequences of three different BSTs

## Question 2

Complete

Marked out of 1.00

Consider the same code as given in above question. What does the function print() do in general? The function print() receives root of a Binary Search Tree (BST) and a positive integer k as arguments.

```
struct node {
    int data;
    struct
    node *left, *right;
};
int count = 0;
void print(struct node *root, int k){
    if (root != NULL && count <= k) {
        print(root->right, k);
        count++;

        if(count == k)
            printf("%d ", root->data);
        print(root->left, k);
    }
}
```

Select one:

- ☒ a. Prints the kth largest element in BST
- ☐ b. Prints the rightmost node at level k from root
- ☐ c. Prints the leftmost node at level k from root
- ☐ d. Prints the kth smallest element in BST

## Question 3

Complete

Marked out of 1.00

In an adjacency list representation of an undirected simple graph  $G = (V, E)$ , each edge  $(u, v)$  has two adjacency list entries:  $[v]$  in the adjacency list of  $u$ , and  $[u]$  in the adjacency list of  $v$ . These are called twins of each other. A twin pointer is a pointer from an adjacency list entry to its twin. If  $|E| = m$  and  $|V| = n$ , and the memory size is not a constraint, what is the time complexity of the most efficient algorithm to set the twin pointer in each entry in each adjacency list?

Select one:

- ☐ a.  $\Theta(m^2)$
- ☐ b.  $\Theta(n^4)$
- ☐ c.  $\Theta(n^2)$
- ☒ d.  $\Theta(m+n)$

## Question 4

Complete

Marked out of 1.00

When searching for the key value 60 in a binary search tree, nodes containing the key values 10, 20, 40, 50, 70, 80, 90 are traversed, not necessarily in the order given. How many different orders are possible in which these key values can occur on the search path from the root to the node containing the value 60?

Select one:

- ☒ a. 35
- ☐ b. 5040
- ☐ c. 128
- ☐ d. 64

## Question 5

Complete

Marked out of 1.00

What is the possible number of binary trees that can be created with 3 nodes, giving the sequence N,M,L when traversed in post-order.

Select one:

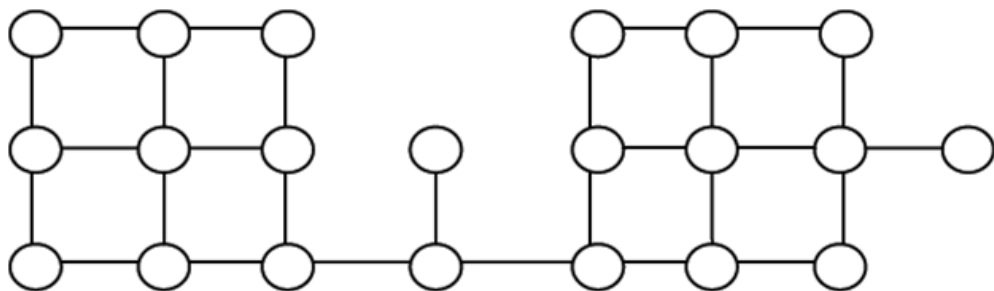
- ☒ a. 5
- ☐ b. 8
- ☐ c. 3
- ☐ d. 15

## Question 6

Complete

Marked out of 1.00

Suppose depth first search is executed on the graph below starting at some unknown vertex. Assume that a recursive call to visit a vertex is made only after first checking that the vertex has not been visited earlier. Then the maximum possible recursion depth (including the initial call) is \_\_\_\_\_.



Select one:

- ☐ a. 18
- ☐ b. 20
- ☐ c. 17
- ☒ d. 19

## Question 7

Complete

Marked out of 1.00

An articulation point in a connected graph is a vertex such that removing the vertex and its incident edges disconnects the graph into two or more connected components. Let  $T$  be a DFS tree obtained by doing DFS in a connected undirected graph  $G$ . Which of the following options is/are correct?

Select one or more:

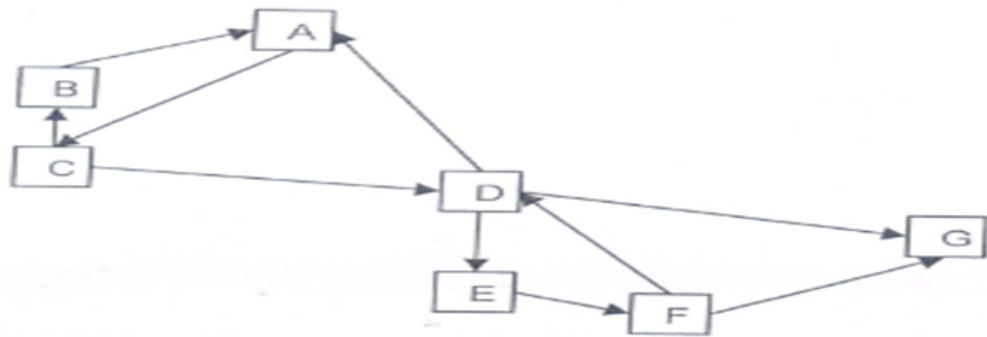
- ☒ a. Root of  $T$  is an articulation point in  $G$  if and only if it has 2 or more children.
- ☐ b. If  $u$  is an articulation point in  $G$  such that  $x$  is an ancestor of  $u$  in  $T$  and  $y$  is a descendent of  $u$  in  $T$ , then all paths from  $x$  to  $y$  in  $G$  must pass through  $u$ .
- ☐ c. Root of  $T$  can never be an articulation point in  $G$ .
- ☐ d. A leaf of  $T$  can be an articulation point in  $G$ .

## Question 8

Complete

Marked out of 1.00

Which of the following is invalid path for the following graph?



Select one:

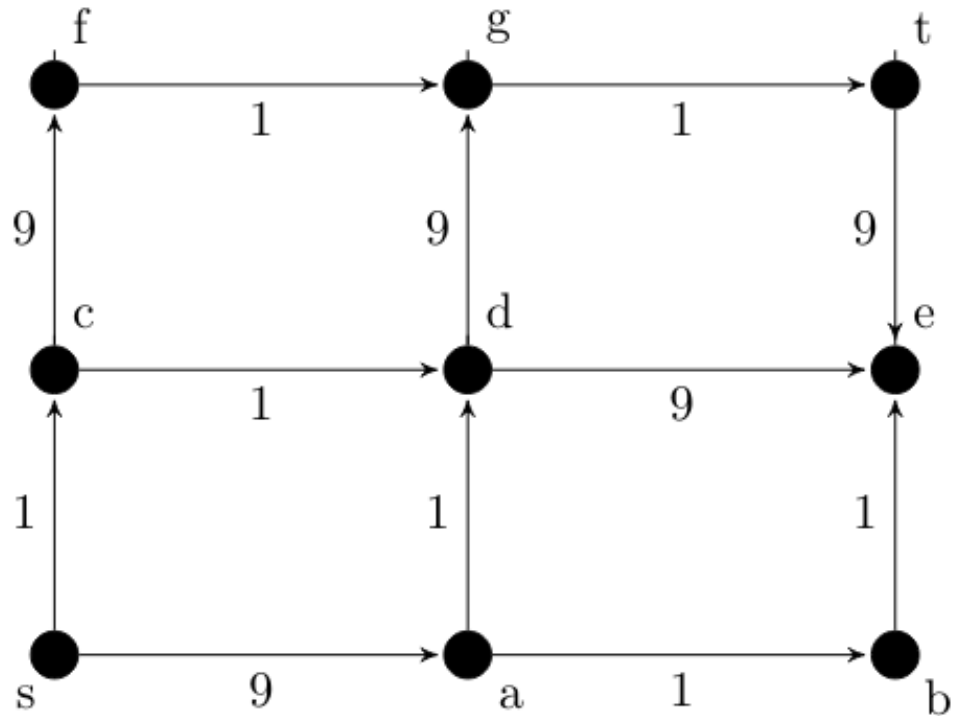
- ☐ a. C D E F G
- ☐ b. C B A
- ☒ c. C D A C B A
- ☐ d. C D A

## Question 9

Complete

Marked out of 1.00

In a directed acyclic graph with a source vertex  $s$ , the quality-score of a directed path is defined to be the product of the weights of the edges on the path. Further, for a vertex  $v$  other than  $s$ , the quality-score of  $v$  is defined to be the maximum among the quality-scores of all the paths from  $s$  to  $v$ . The quality-score of  $s$  is assumed to be 1.



The sum of the quality-scores of all vertices on the graph shown above is \_\_\_\_\_.

Select one:

- ☐ a. 81
- ☒ b. 929
- ☐ c. 1023
- ☐ d. 729