Department of Computer Science and Engineering
University of Liberal Arts Bangladesh
Mid Term Examination
Semester – Fall 2019
Course Title: Data Structure Lab
Course Code: CSE 208 (Sec: 1)
Duration: 2:00 Hours

PLEASE ANSWER ALL QUESTIONS. **Total 30 Marks**

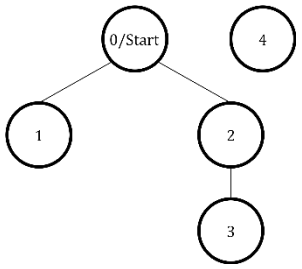
Name: _____ **ID:** _____

QUESTION 1 10 marks

Consider an undirected graph where each of the nodes is labeled consecutively starting from 0.

You will be given a number of queries. For each query, you will be given a list of edges describing an undirected graph. After you create a representation of the graph, you must determine and report the shortest distance to each of the other nodes from a given starting position using the breadth-first search algorithm (BFS). Distances are to be reported in node number order, ascending. If a node is unreachable, print -1 for that node.

For example, given a graph with 5 nodes and 3 edges, $[0,1]$, $[0,2]$, $[2,3]$, a visual representation is:



The start node for the example is node 0. Outputs are calculated for distances to nodes 1 through 4: $[1,1,2,-1]$.

Input Description:

The first line contains an integer q, the number of queries. Each of the following q sets of lines have the following format:

- The first line contains two space-separated integers n and m, the number of nodes and edges in the graph.
- Each line i of the m subsequent lines contains two space-separated integers, u and v, describing an edge connecting node u to node v.
- The last line contains a single integer, s, denoting the index of the starting node.

Output Description:

For each of the q queries, print a single line of $n-1$ space-separated integers denoting the shortest distances to each of the $n-1$ other nodes from starting position s. These distances should be listed sequentially by node number (i.e., $0,1,\ldots,n-1$), but should not include node s. If some node is unreachable from s, print -1 as the distance to that node.

P.T.O

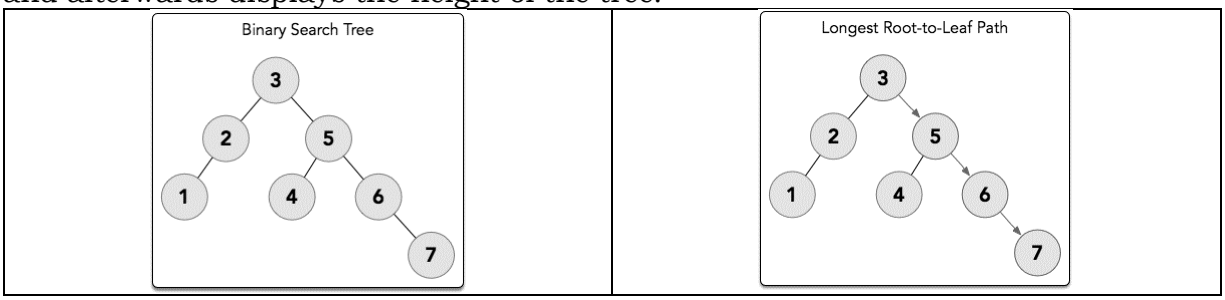
SAMPLE INPUT	SAMPLE OUTPUT
2 4 2 0 1 0 2 0 3 1 1 2 1	1 1 -1 -1 1

QUESTION 2 5 marks

Interview

QUESTION 3 10 marks

The height of a Binary Search Tree is the number of edges between the tree's root and its furthest leaf. Write a program that inserts integer values into a Binary Search tree and afterwards displays the height of the tree.



In the above diagram, there are 4 nodes in the longest root-to-leaf path that are connected by 3 edges, meaning our BST's $height = 3$. Thus, we print 3 as our answer.

Input Description:

The first line contains an integer, n, denoting the number of nodes in the tree. Each of the n subsequent lines contain an integer, $data$, denoting the value of an element that must be added to the BST.

SAMPLE INPUT	SAMPLE OUTPUT
7 3 5 2 1 4 6 7	3

QUESTION 4 5 marks

Interview

****END OF QUESTIONS****