BRAC UNIVERSITY
Inspiring Excellence

CSE220: Data Structures (Lab)
Fall 2024
Lab Quiz - 05
Duration: 35 Minutes

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Name:	ID:	Section:

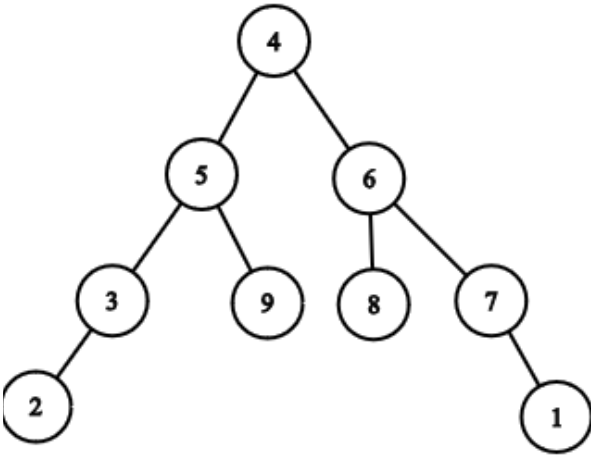
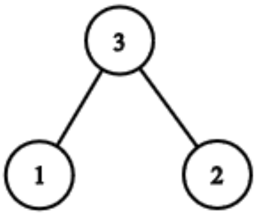
Question 1 [15 Points]

A path in a binary tree is a sequence of nodes that connect a starting node to an ending node, where each consecutive pair of nodes in the sequence is connected by an edge in the tree. In a path, if you select any pair of nodes that are consecutive, the second node will be the child of the first node.

We will call a path an ***upward*** path if the elements in the nodes of that path form a **strictly increasing** sequence. In a strictly increasing sequence, an element **must be greater** than its previous element. 1→2→3 is a strictly increasing sequence, 1→2→2→3 is increasing but not strictly.

In this question, you are given the **root** of a binary tree. Write a function *count_upward_paths(root)* that counts the number of paths that **start** from the **root**, **end** at a **leaf** node and are ***upward*** paths. Assume the tree is constructed, so write only this function.

- Assume the BTNode class is given. You cannot use any other data structures.
- No library functions allowed. You can write as many helper functions as you need.

Sample Input:	**Sample Output:**	**Explanation:**
Input Tree:  	**Output:** **2**	The paths from the root to a leaf in the given tree are: **4→5→3→2 [not upward]** **4→5→9 [upward]** **4→6→8 [upward]** **4→6→7→1 [not upward]** Only the 2nd and 3rd paths form **strictly increasing** sequences. Therefore, only these two are upward paths.
Input Tree:  	**Output:** **0**	There are no **strictly increasing** sequences formed by paths from the root to a leaf in this tree.