DS and Algo Internship Coding Challenge – 6

Q1. Maximum path sum between two Nodes.

Given a non-empty binary tree, find the maximum path sum.

For this problem, a path is defined as any sequence of nodes from some starting node to any node in the tree along the parent-child connections. The path must contain at least one node and does not need to go through the root.

Example 1:

```
Input: [1,2,3]

         1
        / \
       2   3

Output: 6
```

Example 2:

```
Input: [-10,9,20,null,null,15,7]

   -10
   / \
  9   20
      / \
    15   7
Output: 42
```
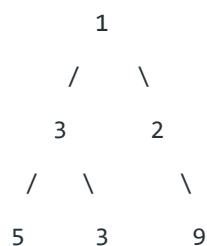
Q2. Largest Value in Each Row

Given a binary tree, You need to find the largest value in each row of the tree.

Example:

```
Input:

       1
      / \
     3   2
    / \   \
   5   3   9
```

Output: [1, 3, 9]

Q3. Lowest Common Ancestor of each Binary Tree

Given a binary tree, find the lowest common ancestor (LCA) of two given nodes in the tree.

"The lowest common ancestor is defined between two nodes p and q as the lowest node in T that has both p and q as descendants (where we allow a node to be a descendant of itself)."

Given the following binary tree: root = [3,5,1,6,2,0,8,null,null,7,4]
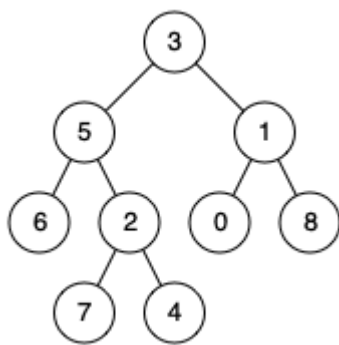
Example 1:

Input: root = [3,5,1,6,2,0,8,null,null,7,4], p = 5, q = 1

Output: 3

Explanation: The LCA of nodes 5 and 1 is 3.

Example 2:

Input: root = [3,5,1,6,2,0,8,null,null,7,4], p = 5, q = 4

Output: 5

Explanation: The LCA of nodes 5 and 4 is 5, since a node can be a descendant of itself according to the LCA definition.
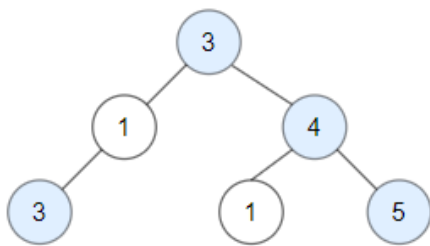

Note:

   • All of the nodes' values will be unique.
   • p and q are different and both values will exist in the binary tree.

Q4. Number of Good Nodes in Binary Tree

Given a binary tree `root`, a node *X* in the tree is named good if in the path from root to *X* there are no nodes with a value *greater than* X.

Return the number of good nodes in the binary tree.

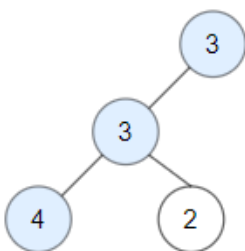Example 1:

Input: root = [3,1,4,3,null,1,5]

Output: 4

Explanation: Nodes in blue are good.Root Node (3) is always a good node.

Node 4 -> (3,4) is the maximum value in the path starting from the root.

Node 5 -> (3,4,5) is the maximum value in the path

Node 3 -> (3,1,3) is the maximum value in the path.

Example 2:

Input: root = [3,3,null,4,2]

Output: 3

Explanation: Node 2 -> (3, 3, 2) is not good, because "3" is higher than it.

Constraints:

- The number of nodes in the binary tree is in the range [1, 10^5].
- Each node's value is between [-10^4, 10^4].