Same Tree Documentation

Problem Statement

Given the roots of two binary trees, p and q, write a function to check if they are the same or not. Two binary trees are considered the same if they are structurally identical and the nodes have the same value.

Example 1

Input: p = [1,2,3], q = [1,2,3]

Output: true

Example 2

Input: p = [1,2], q = [1,null,2]

Output: false

Example 3

Input: p = [1,2,1], q = [1,1,2]

Output: false

Constraints

- The number of nodes in both trees is in the range [0, 100].
- -10^4 <= Node.val <= 10^4

Explanation

1. Base Cases:

- If both nodes p and q are None, then the trees are identical at this branch, so return True.
- If only one of the nodes is None, the trees are not identical, so return False.
- If the values of p and q are different, the trees are not identical, so return False.

2. Recursive Step:

- Recursively check if the left subtrees of p and q are the same.
- Recursively check if the right subtrees of p and q are the same.
- Both conditions must be True for the trees to be identical.

Complexity

- Time Complexity: O(N), where N is the number of nodes in the trees. Each node is visited exactly once.
- Space Complexity: O(N) in the worst case due to the recursion stack, where the trees are skewed.

This solution efficiently checks the structural and value equivalence of two binary trees using a recursive approach.