

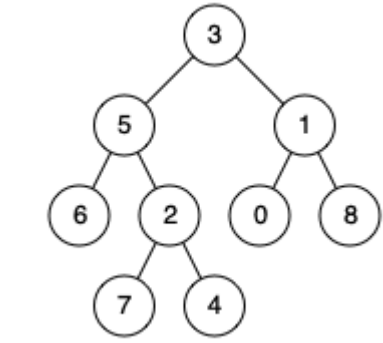
1644. Lowest Common Ancestor of a Binary Tree II

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Given the `root` of a binary tree, return the *lowest common ancestor* (LCA) of two given nodes, `p` and `q`. If either node `p` or `q` **does not exist** in the tree, return `null`. All values of the nodes in the tree are **unique**.

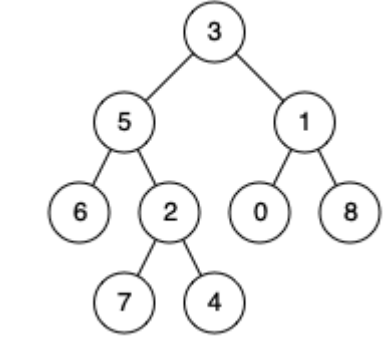
According to the definition of LCA on Wikipedia: "The lowest common ancestor of two nodes `p` and `q` in a binary tree `T` is the lowest node that has both `p` and `q` as **descendants** (where we allow **a node to be a descendant of itself**"). A **descendant** of a node `x` is a node `y` that is on the path from node `x` to some leaf node.

Example 1:



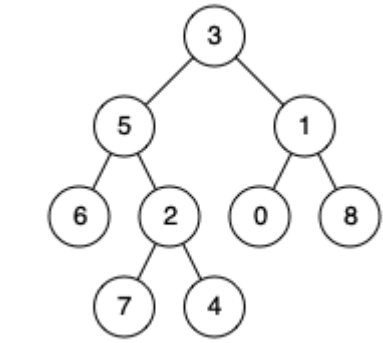
Input: `root = [3,5,1,6,2,0,8,null,null,7,4]`, `p = 5`, `q = 1`
Output: `3`
Explanation: The LCA of nodes 5 and 1 is 3.

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. A node can be a descendant of itself according to the definition of LCA.

Example 3:



Input: `root = [3,5,1,6,2,0,8,null,null,7,4]`, `p = 5`, `q = 10`
Output: `null`
Explanation: Node 10 does not exist in the tree, so return null.

Constraints:

- The number of nodes in the tree is in the range $[1, 10^4]$.
- $-10^9 \leq \text{Node.val} \leq 10^9$
- All `Node.val` are **unique**.
- `p != q`

Follow up: Can you find the LCA traversing the tree, without checking nodes existence?

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Hide Hint 1

Traverse the graph visiting root, left, root, right, root to make an Euler Path

Hide Hint 2

Return the node (LCA) that is at the lowest depth between p and q in the Euler Path

```
1 /**
2  * Definition for a binary tree node.
3  * public class TreeNode {
4  *     int val;
5  *     TreeNode left;
6  *     TreeNode right;
7  *     TreeNode(int x) { val = x; }
8  * }
9  */
10 class Solution {
11     public TreeNode lowestCommonAncestor(TreeNode root, TreeNode p, TreeNode q) {
12
13     }
14 }
```