1516. Move Sub-Tree of N-Ary Tree Premium

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Given the `root` of an N-ary tree of unique values, and two nodes of the tree `p` and `q`.

You should move the subtree of the node `p` to become a direct child of node `q`. If `p` is already a direct child of `q`, do not change anything. Node `p` **must be** the last child in the children list of node `q`.

Return *the root of the tree* after adjusting it.

There are 3 cases for nodes `p` and `q`:

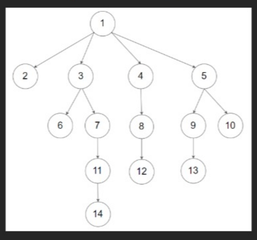
1. Node `q` is in the sub-tree of node `p`.

2. Node `p` is in the sub-tree of node `q`.

3. Neither node `p` is in the sub-tree of node `q` nor node `q` is in the sub-tree of node `p`.

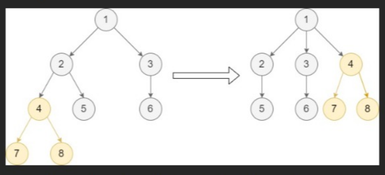
In cases 2 and 3, you just need to move `p` (with its sub-tree) to be a child of `q`, but in case 1 the tree may be disconnected, thus you need to reconnect the tree again. **Please read the examples carefully before solving this problem.**

Nary-Tree input serialization is represented in their level order traversal, each group of children is separated by the null value (See examples).



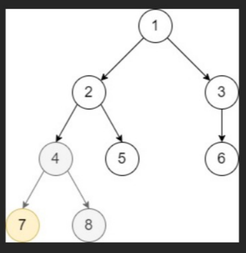
For example, the above tree is serialized as `[1,null,2,3,4,5,null,null,6,7,null,8,null,9,10,null,null,11,null,12,null,13,null,null,14]`.

Example 1:



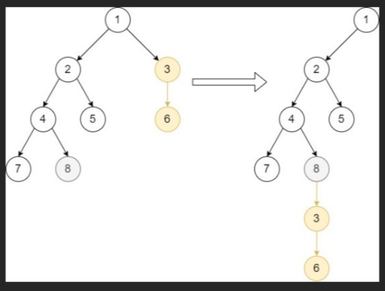

```
Input: root = [1,null,2,3,null,4,5,null,6,null,7,8], p = 4, q = 1
Output: [1,null,2,3,4,null,5,null,6,null,7,8]
Explanation: This example follows the second case as node p is in the sub-tree of node q. We move node p with its sub-tree to be a direct child of node q.
Notice that node 4 is the last child of node 1.
```

Example 2:




```
Input: root = [1,null,2,3,null,4,5,null,6,null,7,8], p = 7, q = 4
Output: [1,null,2,3,null,4,5,null,6,null,7,8]
Explanation: Node 7 is already a direct child of node 4. We don't change anything.
```

Example 3:




```
Input: root = [1,null,2,3,null,4,5,null,6,null,7,8], p = 3, q = 8
Output: [1,null,2,null,4,5,null,7,8,null,null,null,3,null,6]
Explanation: This example follows case 3 because node p is not in the sub-tree of node q and vice-versa. We can move node 3 with its sub-tree and make it as node 8's child.
```

Constraints:

- The total number of nodes is between `[2, 1000]`.
- Each node has a **unique** value.
- `p != null`
- `q != null`
- `p` and `q` are two different nodes (i.e. `p != q`).

Seen this question in a real interview before? 1/5

Yes | No

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Hint 1

Disconnect node p from its parent and append it to the children list of node q.

Hint 2

If q was in the sub-tree of node p (case 1), get the parent node of p and replace p in its children list with q.

Hint 3

If p was the root of the tree, make q the root of the tree.

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