

## Rooting a Tree

- you can root a tree using any of its nodes.
- Rooting a tree is easily done depth first.

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### Rooting Tree pseudocode

# TreeNode object structure

class TreeNode:

# unique integer id to identify this node.

int id;

# Pointer to parent TreeNode reference. only the

# root node has null parent pointer

TreeNode parent;

# List of pointers to child TreeNodes

TreeNode[] children;

### Algorithm to root a tree

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- #  $g$  is the graph / tree represented as an
- # adjacency list with undirected edges. If there is
- # an edge between  $(u, v)$ , there is also an edge
- # between  $(v, u)$ ,  $rootId$  is the id of the node to
- # root the tree from.

function  $rootTree(g, rootId = 0)$ :

$root = TreeNode(rootId, null, [])$ .

return  $buildTree(g, root, null)$

- # Build tree recursively depth first.

function  $buildTree(g, node, parent)$

for  $childId$  in  $g[node.id]$ :

- # Avoid adding an edge pointing back to parent

if  $parent \neq null$  and  $childId == parent.id$ :

continue.

$child = TreeNode(childId, node, [])$

$node.children.add(child)$

$buildTree(g, child, node)$

return  $node$ .