Tree - Review

Definitions

- Tree and rooted tree,
- Sibling nodes, internal nodes, leaves, ancestors, descendants
- Subtree
- Level of a vertex
- Height of a tree
- Binary tree, balanced tree
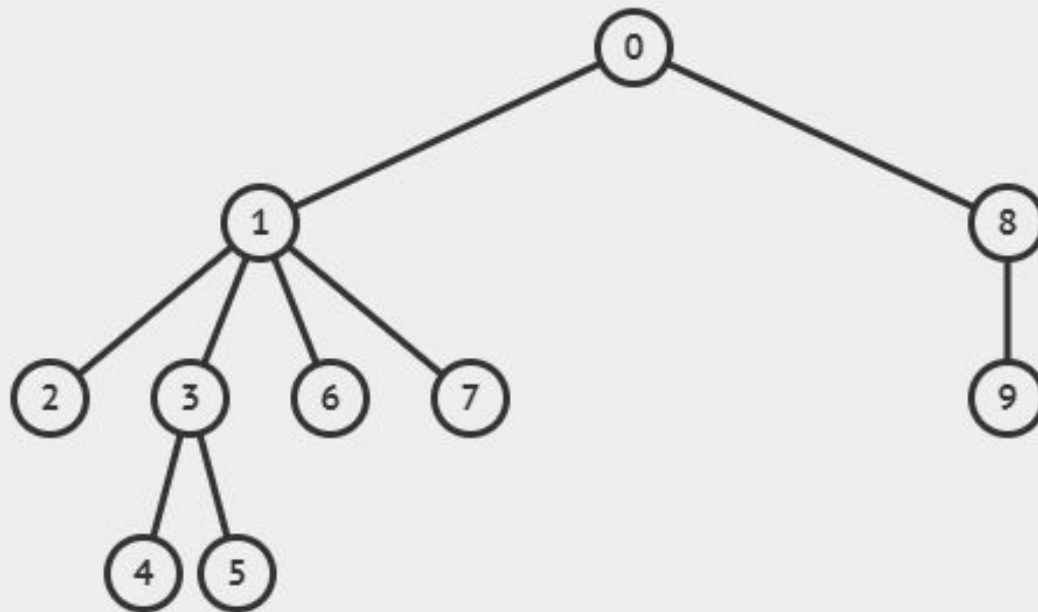- Binary search tree
- Inorder, preoder, postorder

Questions

- Maximum number nodes/leaves in a binary tree of height H.

- **Prove that in a full binary tree the number of vertices is always odd**

- **Prove that in a full binary tree, the number of leaves = the number of internal vertices + 1**

- List 3 ways to check if an undirected graph is a tree

Exercise 1

* Traverse the following tree using BFS and DFS from node 0
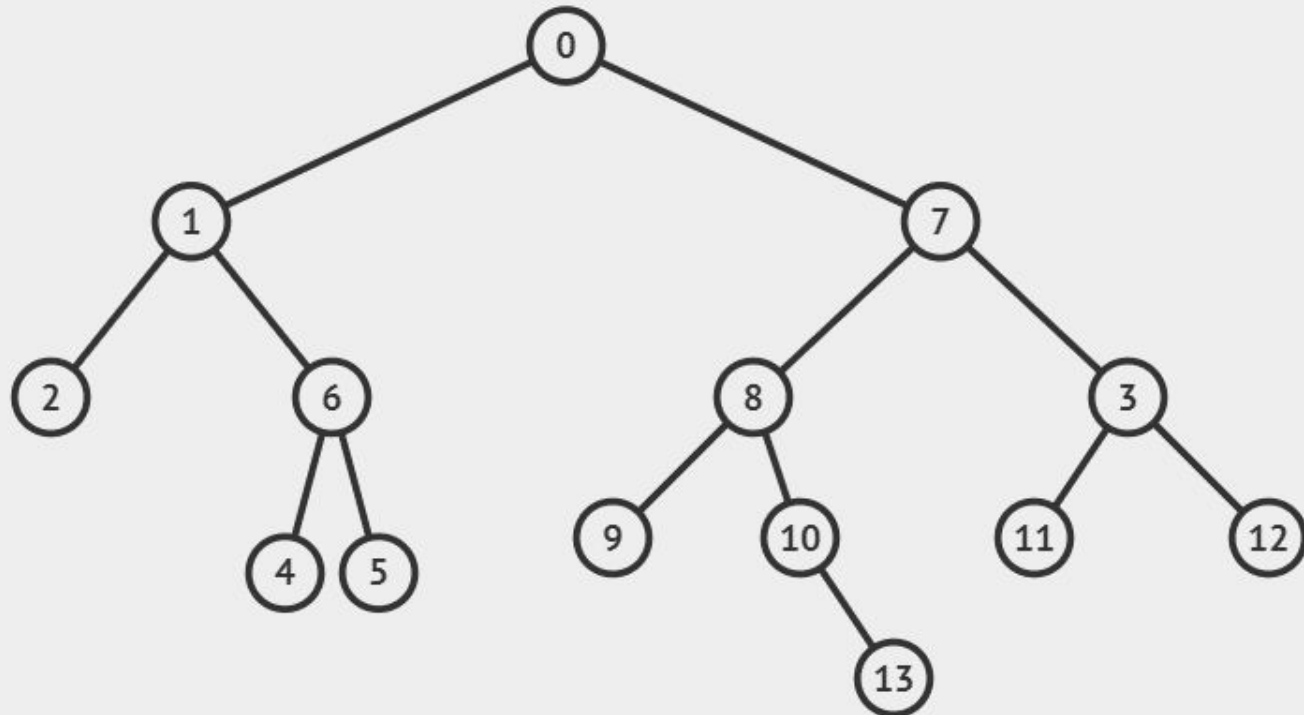* Determine the level of each nodes and the height of the tree if node 9 is the root.

Exercise 2

- Draw the binary search tree if its nodes are inserted in the following order
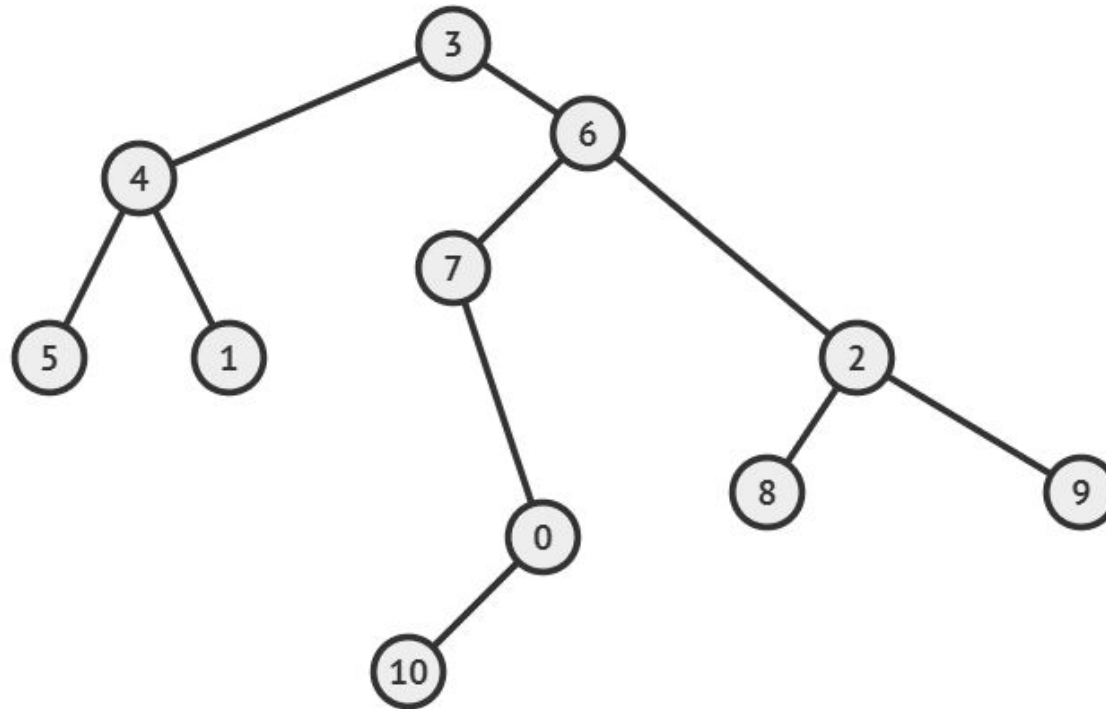 - **13 1 19 5 15 17 9 20 4 7 6 8**

Exercise 3

Traverse the following binary tree and print node's lables with pre-order, in-order, and post-order

Exercise 4

Traverse the following binary tree and print node's lables with pre-order, in-order, and post-order

Exercise 5

- Given the pre-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in post-order

Pre-order: 1 2 0 10 11 4 5 7 3 6 8 9

In-order:10 11 0 2 5 4 7 1 6 8 3 9

Exercise 6

Given the pre-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in post-order

- In-order: 7 8 9 1 5 0 3 11 6 10 4 2

- Pre-order: 0 8 7 5 9 1 3 10 11 6 2 4

Exercise 7

☐ Given the post-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in preorder

PostOrder: 3 10 0 4 5 9 1 6 8 7 2

InOrder: 3 5 0 10 4 2 1 9 6 7 8

Exercise 8

- Given the post-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in preorder

PostOrder: 7 1 5 0 11 3 2 9 10 8 13 4 6

InOrder:1 7 5 6 3 0 11 4 9 2 13 8 10

Exercise 9

- Given the pre-order a binary search tree, construct the given tree and traverse the tree in postorder

0 1 3 4 7 6 5 10 8 9 11

Exercise 10

- Given the pre-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in post-order

Pre-order: 4 3 9 8 6 5 2 1 7 0 13 14
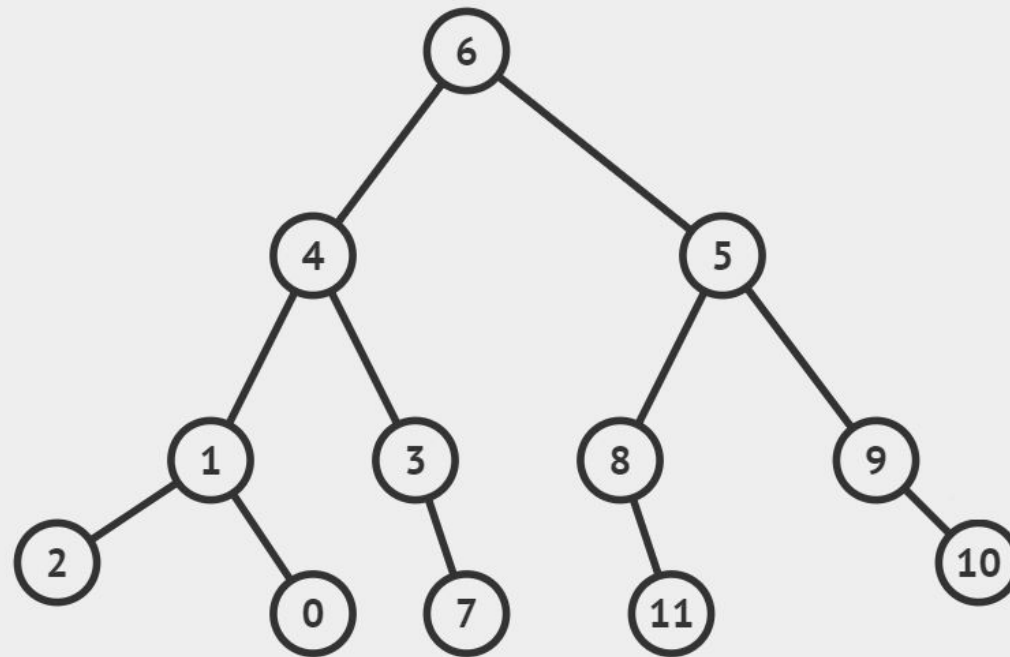
In-order: 9 8 3 5 6 2 4 7 1 13 14 0

Exercise 11

- Given the post-order a binary search tree, construct the given tree and traverse the tree in preorder

1 4 3 6 7 8 10 11 14 13 12 9 5 2

Exercise 12

Traverse the following binary tree and print node's lables with pre-order, in-order, and post-order

Exercise 13

□ Given the post-order and in-order traversals of a binary tree, construct the given tree and traverse the tree in preorder

PostOrder: 1 2 12 5 0 3 7 11 9 10 8 6 4

InOrder:1 3 2 0 12 5 4 7 6 11 9 8 10
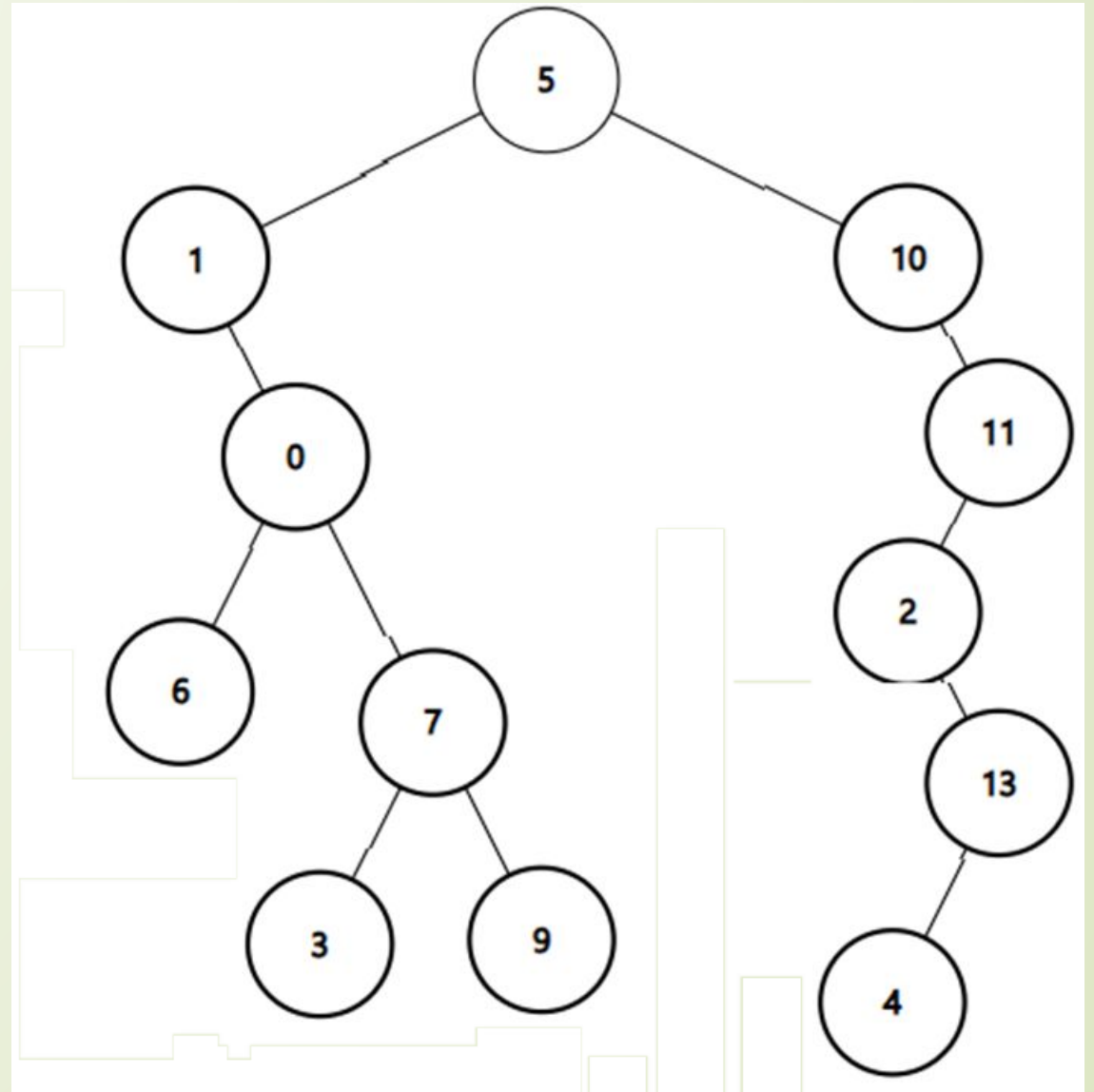
Exercise 14

- Draw the binary search tree if its nodes are inserted in the following order

7 2 26 14 24 17 18 11 30 19 4 16 23 13 20 10 5 25 9

22 2 13 30 7 20 15 21 12 5 18 14 1 24 19

Exercise 15

☐ Traverse the following binary tree and print node's lables with pre-order, in-order, and post-order:

Exercise 16

Construct the binary tree from given Inorder and PostOrder traversals

In-order: 12 1 11 7 8 0 6 10 9 2 4 5 3

Post-order: 12 11 8 7 1 10 9 6 5 3 4 2 0