ICSI213 Data Structures

Notice that students are expected to start the lab as soon as the description is available and seek feedback during the lab. Labs are contiguous study of the lecture or used as stepping-stones for the projects. Skipping lab activities would impact the learning significantly.

Lab 07 Traversals of Binary Trees Part I

For this lab, study the following slides prior to the lab. Work with a partner to solve the problems on the next page during the lab. Submit one PDF file with all solutions included on Duifene on time.

Operations of ADT Binary Tree

- **Traversal operations:**
  - Recursive traversal algorithms
    - Preorder traversal
    - Inorder traversal
    - Postorder traversal
- A traversal algorithm for a binary tree visits each node in the tree
- Each of these traversals visits every node in a binary tree exactly once, performs the same operation (O(1)), independently of n, and traversal is O(n)

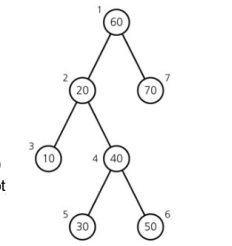
26

Traversals of a Binary Tree

- Preorder traversal algorithm

Assumes that "visit a node" means to display the node's data item.

```
if (the tree is not empty) {
  Display the data in the root of the tree
  preorder(Left subtree of the tree 's root)
  preorder(Right subtree of the tree 's root
}
```



(a) Preorder: 60, 20, 10, 40, 30, 50, 70

(Numbers beside nodes indicate traversal orde

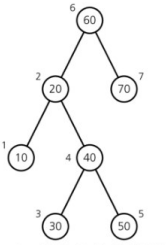
24

Traversals of a Binary Tree

- Inorder traversal algorithm

Assumes that "visit a node" means to display the node's data item.

```
if (the tree is not empty) {
  Inorder(Left subtree of the tree 's root)
  Display the data in the root of the tree
  Inorder(Right subtree of the tree 's root)
}
```



(b) Inorder: 10, 20, 30, 40, 50, 60, 70

der.)

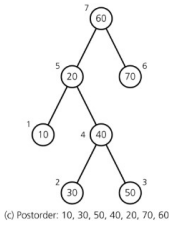
25

Traversals of a Binary Tree

- Postorder traversal algorithm

Assumes that "visit a node" means to display the node's data item.

```
if (the tree is not empty) {
  Postorder(Left subtree of the tree 's root)
  Postorder(Right subtree of the tree 's root)
  Display the data in the root of the tree
}
```



(c) Postorder: 10, 30, 50, 40, 20, 70, 60

26

Tree 1 preorder	10 points
Tree 1 inorder	10 points
Tree 1 postorder	10 points
Tree 2 preorder	10 points
Tree 2 inorder	10 points
Tree 2 postorder	10 points
Total/ 60	60 points
Total/ 5	5 points

Given the following binary trees, list the nodes in the order they are visited in a traversal such as a preorder traversal, an inorder traversal, or a postorder traversal.