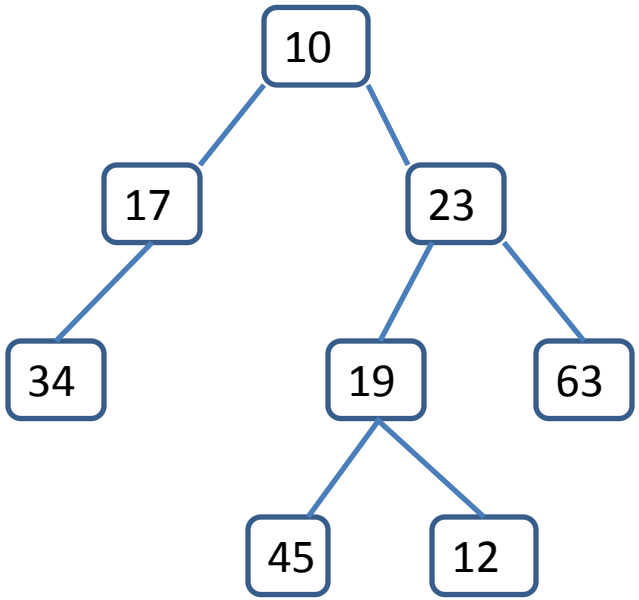
Tree Traversals

See Section 18.4 of Weiss.

We might create Binary Tree structures with the following Node class

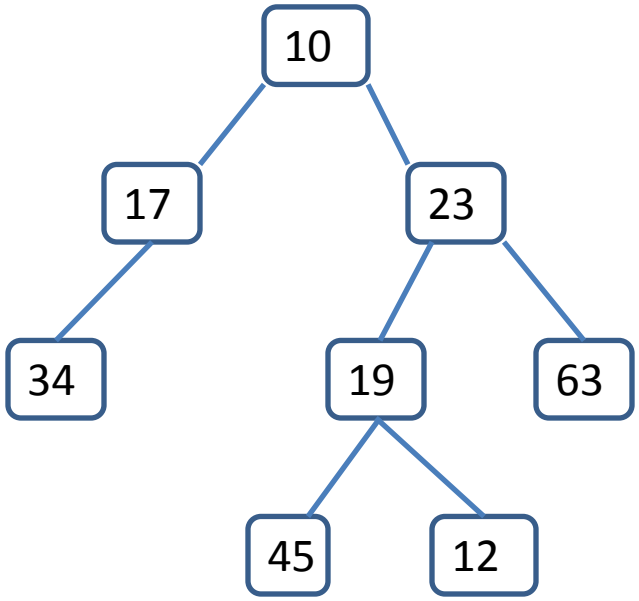
```
class Tree <T> {
        T data;
        Tree<T> left;
        Tree<T> right;
        ....
```

Here is a picture of a Binary Tree with Integer values at each node:



There are three standard ways to iterate through the nodes of a tree:

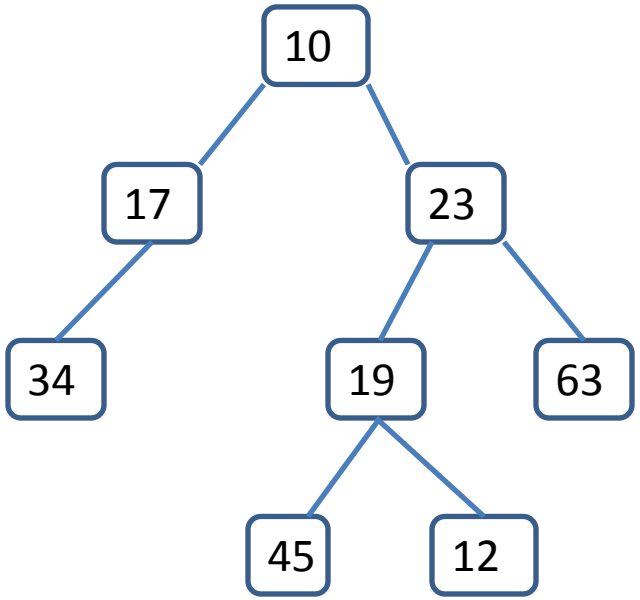
A *preorder traversal* of a tree lists the root, then its left subtree, then its right subtree.



For this tree the preorder traversal is

10 17 34 23 19 45 12 63

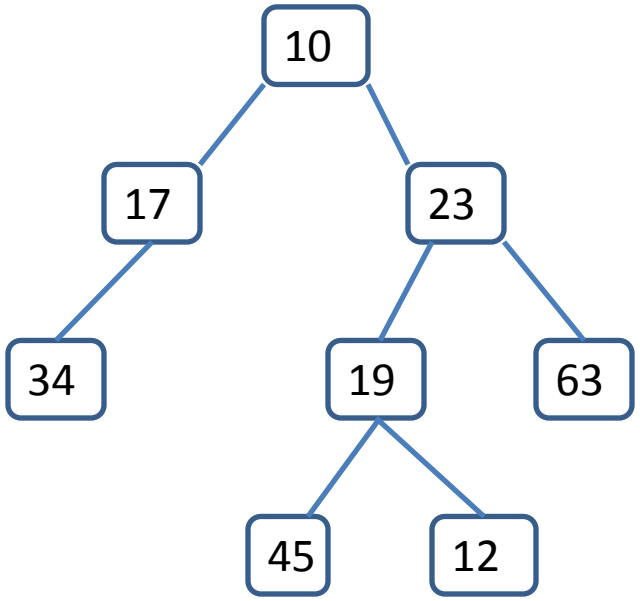
A *postorder traversal* of a tree lists the left subtree, the right subtree and then the root.



For this example the postorder traversal is

34 17 45 12 19 63 23 10

Finally, the *inorder traversal* lists the left subtree, the root, and then the right subtree.



For this example the inorder traversal is

34 17 10 45 19 12 23 63

If all that you want to do is to print the data stored in a node in the order of one of these traversals, a simple recursion does the job. Here is the preorder traversal, assuming that empty trees are represented by null pointers.

```
public void PrintPreorder( TreeNode t) {
        if (t != null) {
                System.out.println(t.data);
                PrintPreorder(t.left);
                PrintPreorder(t.right);
        }
}
```