Lab #10: Tree

The main aim of the lab is to get familiar with Tree structure, especially Binary Tree Search. For give BNode, BST classes are as follows:

```
public class BNode<E extends Comparable<E>> {
	private E data;
	private BNode<E> left;
	private BNode<E> right;

	public BNode(E data) {
		this.data = data;
		this.myLeft = null;
		this.myRight = null;
	}

	public BNode(E data, BNode<E> left, BNode<E> right) {
		this.data = data;
		this.myLeft = left;
		this.myRight = right;
	}

}
```

Binary Search Tree class:

```
public class BST<E extends Comparable<E>> {
	private BNode<E> root;

	public BST() {
		this.root = null;

	}

}
```

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Task 1: Basic Operations with BST

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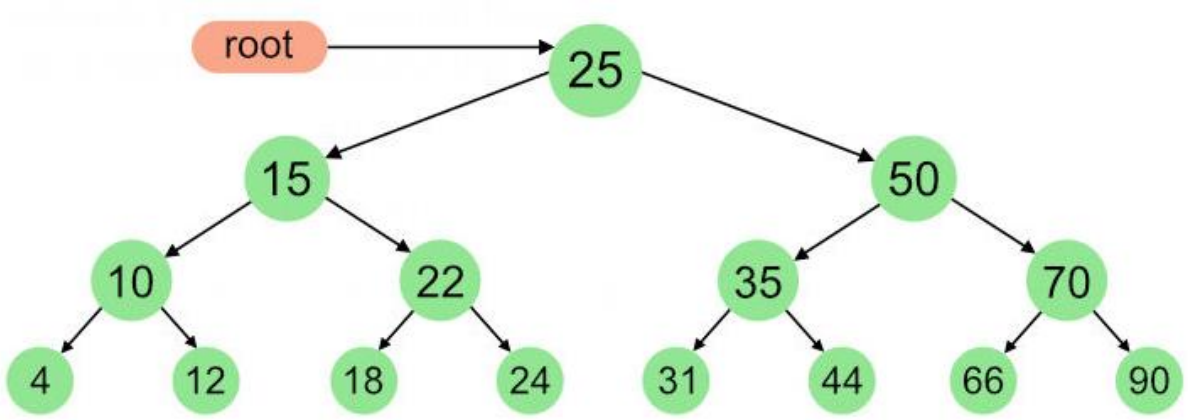
Implement the following methods in the **BST** class:

```
// Add element e into BST
	public void add(E e) {
```

```
        // TODO
    }

    // Add a collection of elements col into BST
    public void add(Collection<E> col) {
        // TODO
    }

    // compute the depth of a node in BST
    public int depth(E node) {
        // TODO
        return -1;
    }

    // compute the height of BST
    public int height() {
        // TODO
        return -1;
    }

    // Compute total nodes in BST
    public int size() {
        // TODO
        return -1;
    }

    // Check whether element e is in BST
    public boolean contains(E e) {
        // TODO
        return false;
    }

    // Find the minimum element in BST
    public E findMin() {
        // TODO
        return null;
    }

    // Find the maximum element in BST
    public E findMax() {
        // TODO
        return null;
    }

    // Remove element e from BST
    public boolean remove(E e) {
        // TODO
```

```
            return false;
      }
// get the descendants of a node
      public List<E> descendants(E data) {
            // TODO
            return null;
      }

      // get the ancestors of a node
      public List<E> ancestors(E data) {
            // TODO
            return null;
      }
```

For testing, use the following BST:



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Task 2: Tree Traversal Algorithms

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Implement the following methods in the **BST** class:

```
// display BST using inorder approach
      public void inorder() {
            // TODO
      }

      // display BST using preorder approach
      public void preorder() {
            // TODO
      }
```

```
// display BST using postorder approach
public void postorder() {
     // TODO
}
```

Using the above BST, traversal results are as follows:

InOrder(root) visits nodes in the following order:
4, 10, 12, 15, 18, 22, 24, 25, 31, 35, 44, 50, 66, 70, 90

A Pre-order traversal visits nodes in the following order:
25, 15, 10, 4, 12, 22, 18, 24, 50, 35, 31, 44, 70, 66, 90

A Post-order traversal visits nodes in the following order:
4, 12, 10, 18, 24, 22, 15, 31, 44, 35, 66, 90, 70, 50, 25