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Lab Exam DSA

Question 1: Binary search

```
package a;

import java.util.Arrays;
import java.util.Scanner;
public class TestClass{

    public int binarySearch(int[] array, int x) {
        int left = 0;
        int right = array.length - 1;
        while (left <= right) {
            int middle = left + (right - left) / 2;
            if (array[middle] == x) {
                return middle;
            } else if (array[middle] < x) {
                left = middle + 1;
            } else {
                right = middle - 1;
            }
        }
        return -1;
    }

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        ClassOne c = new ClassOne();
        int [] arr = new int[] {10,20,4,5,63,47,58};
        Arrays.sort(arr);
        for (int i : arr) {
            System.out.print(i+" ");
        }
        System.out.println();
        Scanner sc = new Scanner(System.in);
        System.out.print("enter a number to search from array :");
        int result = c.binarySearch(arr, sc.nextInt());
        System.out.print("Index position in array is : "+result);
    }
}
```

```
<terminated> TestClass [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe
4 5 10 20 47 58 63
enter a number to search from array :20
Index position in array is : 3
```

Question 2 : Post-order tree traversal.

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```
1 package a;
2 class Node {
3     public int value;
4     public Node left, right;
5
6     public Node(int element){
7         value = element;
8         left = right = null;
9     }
10 }
11 class TestClass2 {
12     Node root;
13     TestClass2() { root = null; }
14
15     void traversePostorder(Node node)
16     {
17         if (node == null)
18             return;
19         traversePostorder(node.left);
20         traversePostorder(node.right);
21         System.out.println(node.value + " ");
22     }
23     void traversePostorder() { traversePostorder(root); }
24     public static void main(String [] args)
25     {
26         TestClass2 bt = new TestClass2();
27         bt.root = new Node(37);
28         bt.root.left = new Node(27);
29         bt.root.right = new Node(47);
30         bt.root.left.left = new Node(22);
31         bt.root.left.right = new Node(32);
32         bt.root.left.left.left = new Node(12);
33         bt.root.left.left.right = new Node(25);
34
35         System.out.println("The Postorder traversal of given binary tree is - ");
36         bt.traversePostorder();
37     }
38 }
```

<terminated> TestClass2 [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe
The Postorder traversal of given binary tree is -
12
25
22
32
27
47
37

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