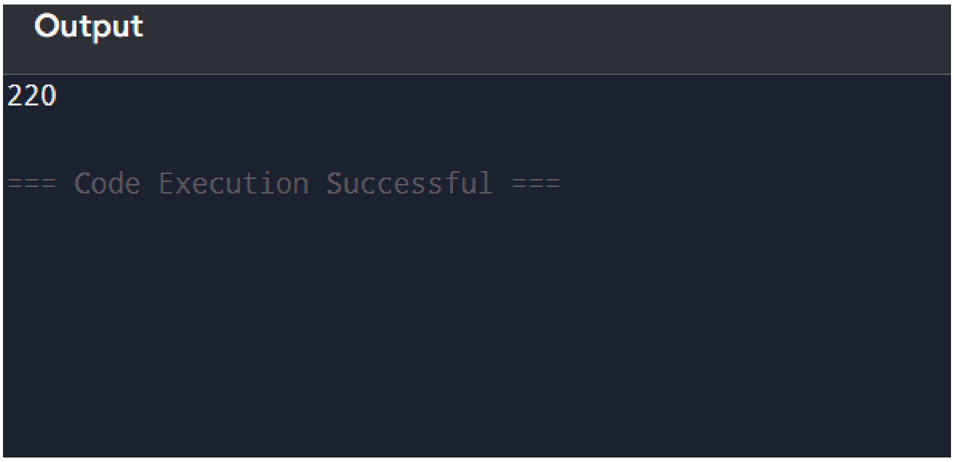
1)0-1 **Knapsack Problem**

```
import java.io.*;
import java.lang.*;
import java.util.*;class Knapsack {
    static int knapSack(int W, int wt[], int val[], int n)
    {

        if (n == 0 || W == 0)
            return 0;
        if (wt[n - 1] > W)
            return knapSack(W, wt, val, n - 1);
        else
            return Math.max(knapSack(W, wt, val, n - 1),
             val[n - 1] + knapSack(W - wt[n-1], wt, val, n-1));
    }
    public static void main(String args[])
           {
        int profit[] = new int[] { 60, 100, 120 };
        int weight[] = new int[] { 10, 20, 30 };
        int W = 50;
        int n = profit.length;
        System.out.println(knapSack(W, weight, profit, n));
}
}
```

Time Complexity: O(2N)
Auxiliary Space: O(N)

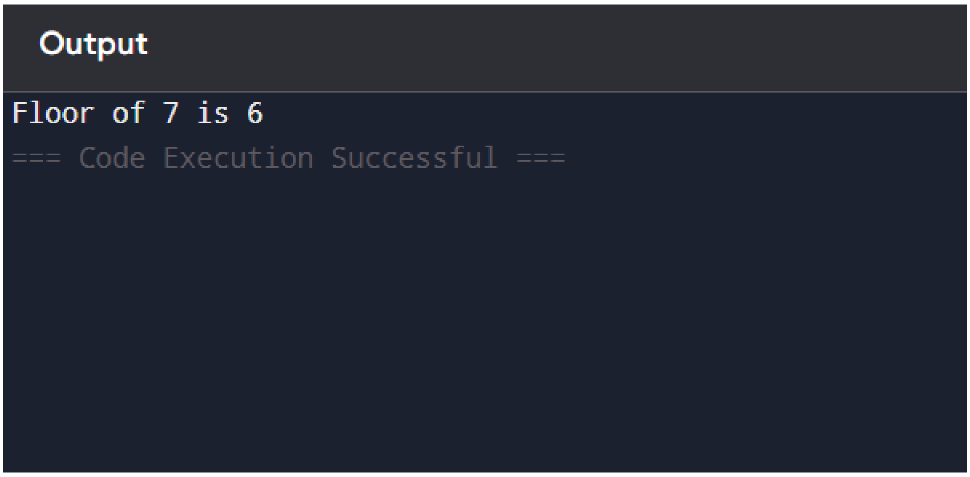


```
220

=== Code Execution Successful ===
```

2)Floor in Sorted Array

```
import java.io.*;

import java.lang.*;

import java.util.*;


class Floor {

        static int floorSearch(int arr[], int n, int x)

        {

                // If last element is smaller than x

                if (x >= arr[n - 1])

                        return n - 1;


                // If first element is greater than x

                if (x < arr[0])

                        return -1;

                for (int i = 1; i < n; i++)

                        if (arr[i] > x)

                                return (i - 1);

                return -1;

        }

        public static void main(String[] args)

        {
                int arr[] = { 1, 2, 4, 6, 10, 12, 14 };

                int n = arr.length;

                int x = 7;

                int index = floorSearch(arr, n - 1, x);

                if (index == -1)

                        System.out.print("Floor of " + x

                                                        + " doesn't exist in array ");

                else

                        System.out.print("Floor of " + x + " is "+ arr[index]);

        }

}
```

Time Complexity: O(N)
Auxiliary Space: O(1)



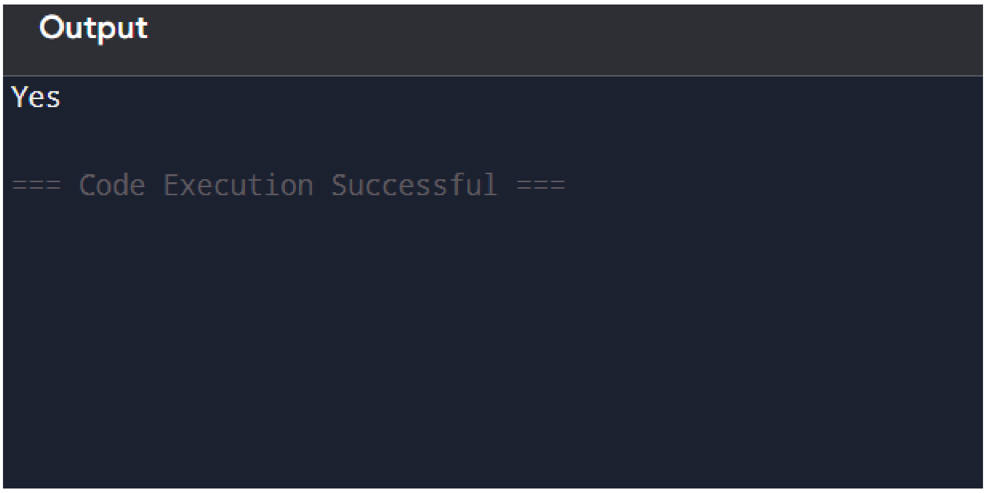
```
Floor of 7 is 6
=== Code Execution Successful ===
```

3)Check Equal Arrays

```
import java.io.*;

import java.util.*;


class Eqarrays{

   public static boolean areEqual(int arr1[], int arr2[])

   {
    int N = arr1.length;
    int M = arr2.length;
    if (N != M)
        return false;
    Map<Integer, Integer> map= new HashMap<Integer, Integer>();
    int count = 0;
    for (int i = 0; i < N; i++) {
        if (map.get(arr1[i]) == null)
            map.put(arr1[i], 1);
        else {
            count = map.get(arr1[i]);
            count++;
            map.put(arr1[i], count);
        }
    }
    for (int i = 0; i < N; i++) {
        if (!map.containsKey(arr2[i]))
            return false;
        if (map.get(arr2[i]) == 0)
            return false;

        count = map.get(arr2[i]);
        --count;
        map.put(arr2[i], count);
    }

    return true;
}
public static void main(String[] args)
{
    int arr1[] = { 3, 5, 2, 5, 2 };
```

```
        int arr2[] = { 2, 3, 5, 5, 2 };


        if (areEqual(arr1, arr2))
            System.out.println("Yes");
        else
            System.out.println("No");
    }
}
```

Time Complexity: O(N)
Auxiliary Space: O(N)



Output

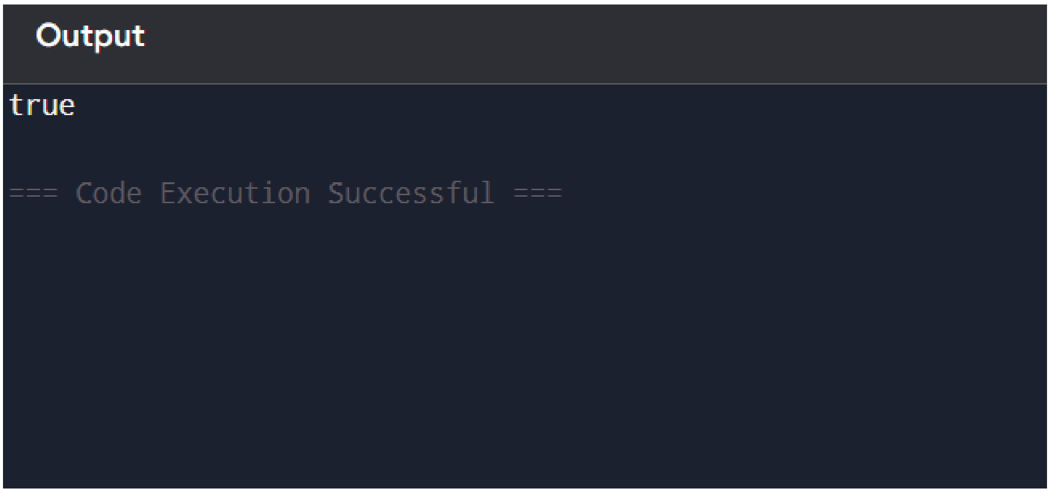
```
Yes

=== Code Execution Successful ===
```

4)Palindrome Linked List

```
class Node {
    int data;
    Node next;
    Node(int d) {
        data = d;
        next = null;
    }
}
class Palindrome_LL {
    static Node reverseList(Node head) {
        Node prev = null;
    Node curr = head;
    Node next;

    while (curr != null) {
        next = curr.next;
        curr.next = prev;
        prev = curr;
        curr = next;
    }
    return prev;
}
static boolean isIdentical(Node n1, Node n2) {
    while (n1 != null && n2 != null) {
        if (n1.data != n2.data)
            return false;
        n1 = n1.next;
        n2 = n2.next;
    }
    return true;
}
static boolean isPalindrome(Node head) {
    if (head == null || head.next == null)
        return true;

    Node slow = head, fast = head;

    while (fast.next != null
           && fast.next.next != null) {
        slow = slow.next;
        fast = fast.next.next;
    }
```

```
        Node head2 = reverseList(slow.next);
        slow.next = null;

        boolean ret = isIdentical(head, head2);

        head2 = reverseList(head2);
        slow.next = head2;

        return ret;
    }

    public static void main(String[] args) {

        Node head = new Node(1);
        head.next = new Node(2);
        head.next.next = new Node(3);
        head.next.next.next = new Node(2);
        head.next.next.next.next = new Node(1);

        boolean result = isPalindrome(head);

        if (result)
            System.out.println("true");
        else
            System.out.println("false");
    }
}
```

Time Complexity: O(n)
Auxiliary Space: O(1)



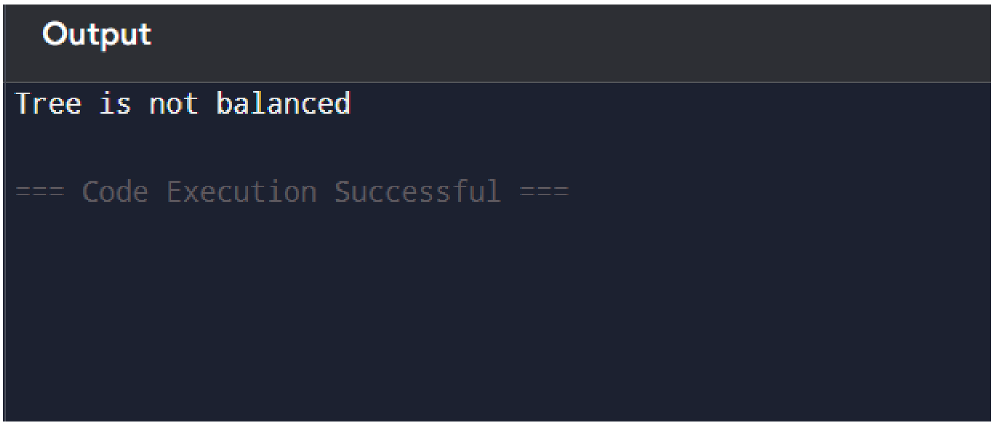
Output

```
true

=== Code Execution Successful ===
```

5)Balanced Tree Check

```
class Node {
    int data;
    Node left, right;
    Node(int d)
    {
        data = d;
        left = right = null;
    }
}

class BinaryTree {
    Node root;
    boolean isBalanced(Node node)
    {
        int lh;
        int rh;
        if (node == null)
            return true;

        lh = height(node.left);
        rh = height(node.right);

        if (Math.abs(lh - rh) <= 1 && isBalanced(node.left)
            && isBalanced(node.right))
            return true;
        return false;
    }

    int height(Node node)
    {
        if (node == null)
            return 0;
        return 1
            + Math.max(height(node.left),
                       height(node.right));
    }

    public static void main(String args[])
    {
        BinaryTree tree = new BinaryTree();
        tree.root = new Node(1);
        tree.root.left = new Node(2);
        tree.root.right = new Node(3);
        tree.root.left.left = new Node(4);
        tree.root.left.right = new Node(5);
        tree.root.left.left.left = new Node(8);

        if (tree.isBalanced(tree.root))
            System.out.println("Tree is balanced");
        else
            System.out.println("Tree is not balanced");
    }
}
```

Time Complexity: O(n^2)
Auxiliary Space: O(n)



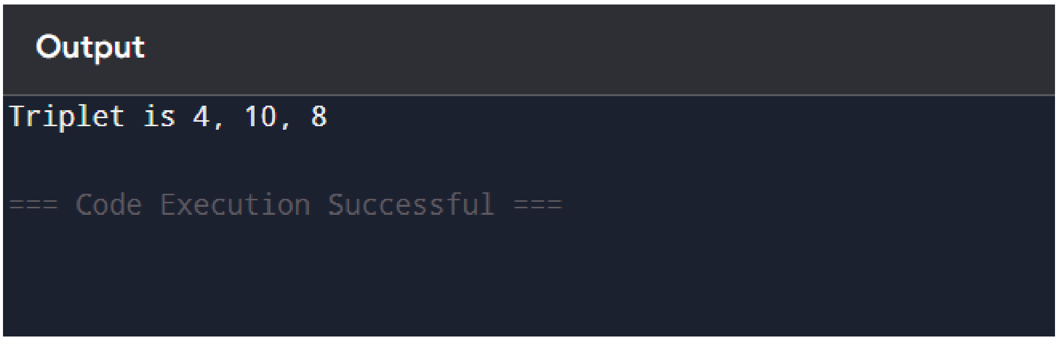
Output

```
Tree is not balanced

=== Code Execution Successful ===
```

6)Triplet Sum in Array

```
import java.util.Arrays;

public class Triplet {

    static boolean find3Numbers(int[] arr, int sum)

    {

        int n = arr.length;

        for (int i = 0; i < n - 2; i++) {

            for (int j = i + 1; j < n - 1; j++) {

                for (int k = j + 1; k < n; k++) {


                    if (arr[i] + arr[j] + arr[k] == sum) {

                        System.out.println(

                            "Triplet is " + arr[i] + ", "

                            + arr[j] + ", " + arr[k]);

                        return true;

                    }

                }

            }

        }
        return false;
    }
    public static void main(String[] args)
    {
        int[] arr = { 1, 4, 45, 6, 10, 8 };
        int sum = 22;

        find3Numbers(arr, sum);
    }
}
```

Time Complexity: O(n^3)
Auxiliary Space: O(1)



```
Triplet is 4, 10, 8

=== Code Execution Successful ===
```