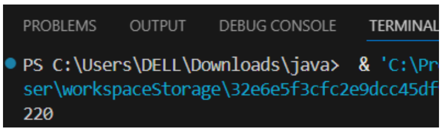
Date: 11/11/2024

DSA Practice Problems

1. 0-1 knapsack problem

```
public class Knapsack {
    static int calculateprofit(int W, int weight[],int profit[],int n){
        int dp[]=new int[W+1];
        for(int i=0;i<n;i++){
            for(int w=W;w>=weight[i];w--){
                dp[w]=Math.max(dp[w],dp[w-weight[i]]+profit[i]);
            }
        }
        return dp[W];
    }
    public static void main(String[] args){
        int capacity=50;
        int weight[]={ 10,20,30};
        int profit[]={ 60,100,120};
        int n=profit.length;
        System.out.println(calculateprofit(capacity, weight, profit, n));
    }
}
```



```
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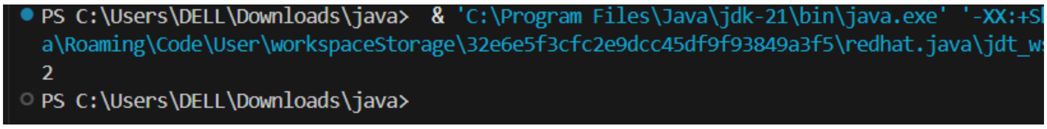
220
```

Time Complexity: O(n*W)

2. Floor in sorted array

```
public class FloorSortedArray {
    static int floorSearch(int arr[], int low, int high, int x) {
        if (low > high)
            return -1;
        if (x >= arr[high])
            return high;
        int mid = (low + high) / 2;
        if (arr[mid] == x)
            return mid;
        if (mid > 0 && arr[mid - 1] <= x && x < arr[mid])
            return mid - 1;
        if (x < arr[mid])
            return floorSearch(arr, low, mid - 1, x);
        return floorSearch(arr, mid + 1, high, x);
    }
    public static void main(String[] args) {
        int arr[] = {1, 2, 4, 6, 10, 12, 14};
        int n = arr.length;
        int x = 5;
        System.out.println(floorSearch(arr, 0, n - 1, x));
    }
}
```



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  a\Roaming\Code\User\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_w
  2
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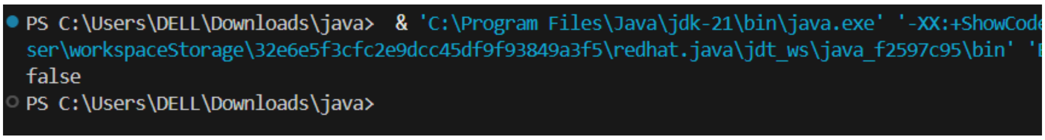
```

Time Complexity: O(log n)

3. Check equal arrays

```
import java.util.Arrays;

class EqualArray {
    public static boolean CheckEqual(int arr1[], int arr2[]) {
        int n = arr1.length;
        int m = arr2.length;
        if (n!=m)
            return false;
        Arrays.sort(arr1);
        Arrays.sort(arr2);
        for (int i = 0; i < n; i++)
            if (arr1[i] != arr2[i])
                return false;
        return true;
    }
    public static void main(String[] args) {
        int arr1[] = {3, 5, 2, 5, 2};
        int arr2[] = {2, 3, 6, 5, 2};
        System.out.println(CheckEqual(arr1,arr2));
    }
}
```



```
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  false
○ PS C:\Users\DELL\Downloads\java>
```

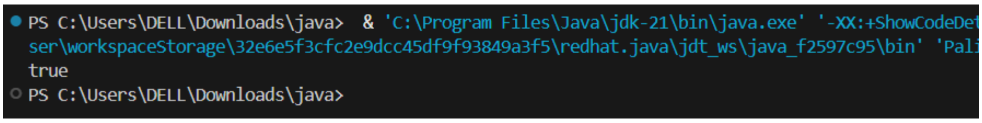
Time Complexity: O(n log n)

4. Palindrome linked list

```
public class PalindromeLinkedList {
    static class Node {
        int data;
        Node next;
        Node(int data) {
            this.data = data;
            this.next = null;
        }
    }

    static boolean CheckPalindrome(Node head) {
        if (head == null || head.next == null) {
            return true;
        }
        int length = 0;
        Node temp = head;
        while (temp != null) {
            length++;
            temp = temp.next;
        }
        Node start = head;
        Node end = head;
        for (int i = 0; i < length - 1; i++) {
            end = end.next;
        }
        for (int i = 0; i < length / 2; i++) {
            if (start.data != end.data) {
                return false;
            }
            start = start.next;
            Node tempend = head;
            for (int j = 0; j < length - i - 2; j++) {
                tempend = tempend.next;
            }
            end = tempend;
        }
        return true;
    }

    public static void main(String[] args) {
        Node head = new Node(1);
        head.next = new Node(2);
        head.next.next = new Node(1);
        head.next.next.next = new Node(1);
        head.next.next.next.next = new Node(2);
        head.next.next.next.next.next = new Node(1);
        System.out.println(CheckPalindrome(head));
    }
}
```



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  ser\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_ws\java_f2597c95\bin' 'Pali
  true
○ PS C:\Users\DELL\Downloads\java>
```

Time Complexity: O(N)

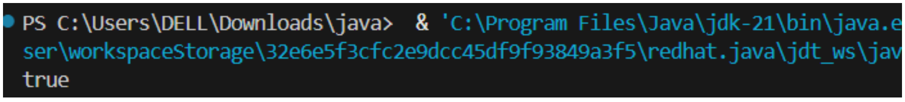
5. Balanced tree check

```
class Node {
    int data;
    Node left, right;

    Node(int data) {
        this.data = data;
        left = right = null;
    }
}

class BalancedTreeCheck {

    static boolean CheckBalanced(Node root) {
        return height(root) != -1;
    }
    static int height(Node node) {
        if (node == null) {
            return 0;
        }
        int leftheight = height(node.left);
        int rightheight = height(node.right);
        if (leftheight == -1 || rightheight == -1 || Math.abs(leftheight - rightheight) > 1) {
            return -1;
        }
        return Math.max(leftheight, rightheight) + 1;
    }
    public static void main(String[] args) {
        Node root = new Node(10);
        root.left = new Node(20);
        root.right = new Node(30);
        root.left.left = new Node(40);
        root.left.right = new Node(60);
        System.out.println(CheckBalanced(root));
    }
}
```



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ser\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_ws\jav
true
```

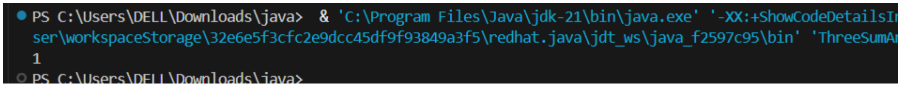
Time Complexity: O(N)

6. Triplet sum in array

```
import java.util.Arrays;

public class ThreeSumArray {
    static void CalculateSum(int[] arr, int sum) {
        int n = arr.length;
        Arrays.sort(arr);
        int count = 0;
        for (int i = 0; i < n - 2; i++) {
            int left = i + 1;
            int right = n - 1;
            while (left < right) {
                int calculate_sum = arr[i] + arr[left] + arr[right];
                if (calculate_sum == sum) {
                    count++;
                    left++;
                    right--;
                } else if (calculate_sum < sum) {
                    left++;
                } else {
                    right--;
                }
            }
        }
        if (count == 0) {
            System.out.println(0);
        } else {
            System.out.println(count);
        }
    }

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



```
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  ser\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_ws\java_f2597c95\bin' 'ThreeSumAr
  1
○ PS C:\Users\DELL\Downloads\java>
```

Time Complexity: O(n^2)