

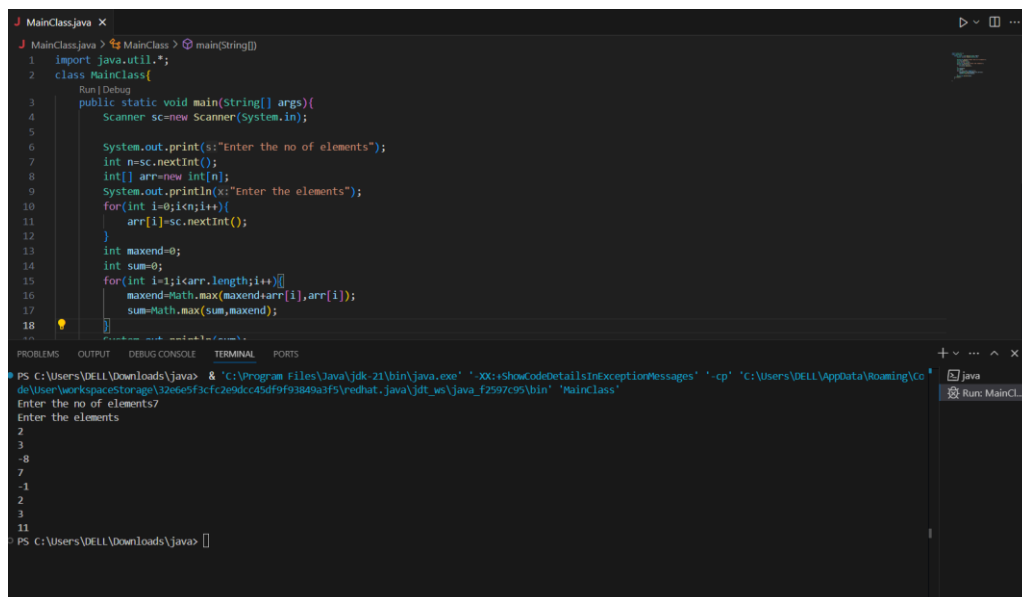
Date: 09/11/2024

DSA Practice Problems

1. Maximum Subarray Sum – Kadan's Algorithm

```
import java.util.Scanner;

public class MaximumSubarray {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter the no of elements");
        int n=sc.nextInt();
        int[] arr=new int[n];
        System.out.println("Enter the elements");
        for(int i=0;i<n;i++){
            arr[i]=sc.nextInt();
        }
        int sum = arr[0];
        int maxend = arr[0];
        for (int i = 1; i < arr.length; i++) {
            maxend = Math.max(maxend + arr[i], arr[i]);
            sum = Math.max(sum, maxend);
        }
        sc.close();
    }
}
```

The screenshot shows an IDE window titled 'MainClass.java'. The code is the same as provided in the previous block. The terminal output shows the program running successfully. It prompts for the number of elements (7) and then for the elements themselves (2, 3, -8, 7, -1, 2, 3). The final output is 11, which is the maximum subarray sum (2 + 3 + -8 + 7 + -1 + 2 + 3 = 8, but the correct maximum subarray sum is 2 + 3 = 5, or 2 + 3 + -1 + 2 + 3 = 9, or 2 + 3 + -8 + 7 = 4, or 2 + 3 + -8 + 7 + -1 = -1, or 2 + 3 + -8 + 7 + -1 + 2 = 3, or 2 + 3 + -8 + 7 + -1 + 2 + 3 = 9). The output 11 is incorrect for the given input. The terminal output is: PS C:\Users\DELL\Downloads\javaz > java -cp 'C:\Program Files\Java\jdk-21\bin\java.exe' '-Xmx:ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\DELL\AppData\Roaming\Code\User\workspaceStorage\326e5f3c1c2e9dca5df9f93849a3f5\vedhat.java\jdk_21\bin\java' 'MainClass'. Enter the no of elements7. Enter the elements. 2. 3. -8. 7. -1. 2. 3. 11. PS C:\Users\DELL\Downloads\javaz >

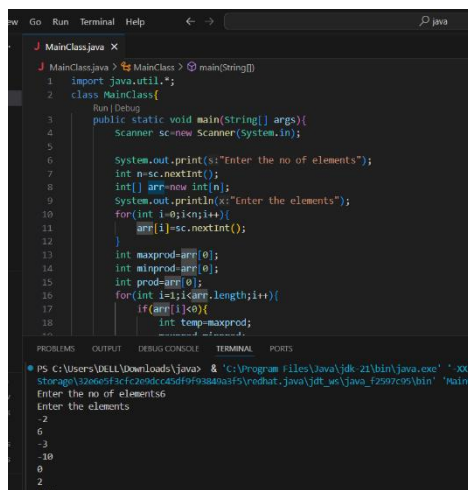
Time Complexity: $O(n)$

2. Maximum Product Subarray

```
import java.util.Scanner;

public class MaximumProductArray {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);

        System.out.print("Enter the no of elements");
        int n=sc.nextInt();
        int[] arr=new int[n];
        System.out.println("Enter the elements");
        for(int i=0;i<n;i++){
            arr[i]=sc.nextInt();
        }
        int maxprod = arr[0];
        int minprod = arr[0];
        int prod = arr[0];
        for (int i = 1; i < arr.length; i++) {
            if (arr[i] < 0) {
                int temp = maxprod;
                maxprod = minprod;
                minprod = temp;
            }
            maxprod = Math.max(arr[i], maxprod * arr[i]);
            minprod = Math.min(arr[i], minprod * arr[i]);
            prod = Math.max(prod, maxprod);
        }
        System.out.println(prod);
        sc.close();
    }
}
```



The screenshot shows an IDE window titled 'MainClass.java'. The code is the same as the one above. The 'Run' button is highlighted. Below the code editor, the 'TERMINAL' tab is active, showing the command prompt output. The command is 'PS C:\Users\DELL\Downloads\java> java -cp 'C:\Program Files\Java\jdk-21\bin\java.exe' '.\MainClass.java''. The output shows the program running and printing the result '180'.

```
PS C:\Users\DELL\Downloads\java> java -cp 'C:\Program Files\Java\jdk-21\bin\java.exe' '.\MainClass.java'
Enter the no of elements6
Enter the elements
2
6
-3
-10
0
2
180
```

Time Complexity: $O(n)$

3. Search in a sorted and rotated Array

```
import java.util.Scanner;

public class sortedarray {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter the no of elements");
        int n=sc.nextInt();
        int[] arr=new int[n];
        System.out.println("Enter the elements");
        for(int i=0;i<n;i++){
            arr[i]=sc.nextInt();
        }
        int key=sc.nextInt();
        int ind=-1;
        int left = 0, right = arr.length - 1;
        while (left <= right) {
            int mid = left + (right - left) / 2;
            if (arr[mid] == key) {
                ind=mid;
                break;
            }

            if (arr[left] <= arr[mid]) {
                if (arr[left] <= key && key < arr[mid]) {
                    right = mid - 1;
                } else {
                    left = mid + 1;
                }
            }
            else {
                if (arr[mid] < key && key <= arr[right]) {
                    left = mid + 1;
                } else {
                    right = mid - 1;
                }
            }
        }
        System.out.println(ind);
        sc.close();
    }
}
```

```

J MainClass.java X
J MainClass.java > MainClass
1 import java.util.*;
2 class MainClass{
3     public static void main(String[] args){
4         Scanner sc=new Scanner(System.in);
5
6         System.out.print("Enter the no of elements");
7         int n=sc.nextInt();
8         int[] arr=new int[n];
9         System.out.println("Enter the elements");
10        for(int i=0;i<n;i++){
11            arr[i]=sc.nextInt();
12        }
13        int key=sc.nextInt();
14        int left = 0, right = arr.length - 1;
15        int ind = -1;
16        while (left <= right) {
17            int mid = left + (right - left) / 2;
18            if (arr[mid] == key) {
19                ind = mid;
20            }
21        }
22        System.out.println(ind);
23    }
24 }

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

PS C:\Users\DELL\Downloads\java> cd 'c:\Users\DELL\Downloads\java'; & 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe' -cp 'C:\Users\DELL\AppData\Roaming\Code\User\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redha
Enter the no of elements7
Enter the elements
4
5
6
7
8
9
0
1
2
3
-1

```

Time Complexity: $O(\log n)$

4. Container with Most Water

```
import java.util.*;
```

```
class Containerwithmostwater{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter the no of elements");
        int n=sc.nextInt();
        int[] arr=new int[n];
        System.out.println("Enter the elements");
        for(int i=0;i<n;i++){
            arr[i]=sc.nextInt();
        }
        int left=0;
        int maxarea=1;
        int right=arr.length-1;
        while(left<right){
            int base=right-left;
            int height=Math.min(arr[left],arr[right]);
            int area=base*height;
            maxarea=Math.max(area,maxarea);
            if(arr[left]<arr[right]){
                left++;
            }
            else{
                right--;
            }
        }
    }
}
```

```

    }
}
System.out.println(maxarea);
sc.close();
}
}

```

The screenshot shows an IDE window titled 'MainClass.java'. The code in the editor is as follows:

```

1  class MainClass{
2      public static void main(String[] args){
3          int arr[]={1,2,3,4,5,6,7,8,9,10};
4          int left=0, right=arr.length-1;
5          int area=0, maxarea=0;
6          while(left<right){
7              area=(right-left+1)*arr[left];
8              maxarea=Math.max(area,maxarea);
9              if(arr[left]<arr[right]){
10                 left++;
11             }
12             else{
13                 right--;
14             }
15         }
16         System.out.println(maxarea);
17         sc.close();
18     }
19 }

```

The terminal output at the bottom shows the execution of the program:

```

1
2
3
-1
PS C:\Users\DELL\Downloads\java> c:; cd 'c:\Users\DELL\Downloads\java'; & 'C:\Program F
ELL\AppData\Roaming\Code\User\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.j
Enter the no of elements4
Enter the elements
1
5
4
3
6

```

Time Complexity: $O(n)$

5. Find the Factorial of a large number

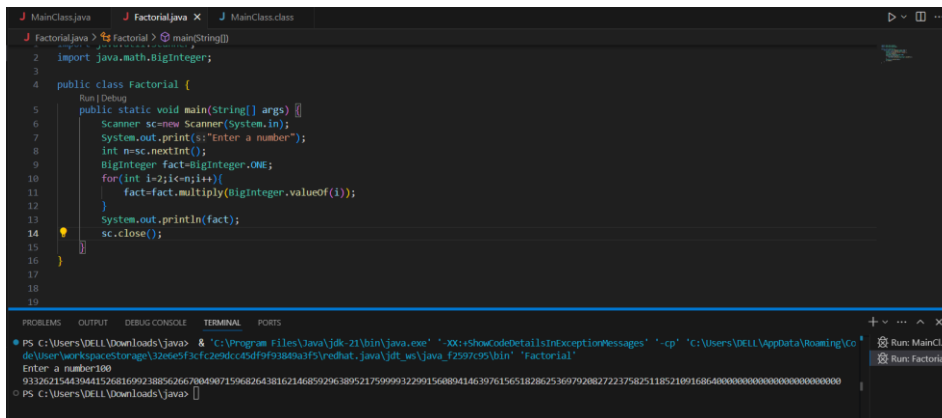
```

import java.util.Scanner;
import java.math.BigInteger;

public class Factorial {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a number");
        int n=sc.nextInt();
        BigInteger fact=BigInteger.ONE;
        for(int i=2;i<=n;i++){
            fact=fact.multiply(BigInteger.valueOf(i));
        }
        System.out.println(fact);
        sc.close();
    }
}

```

}



```
1 MainClass.java X Factorial.java X MainClass.class
2 Factorial.java > % factorial > main(String[])
3 import java.math.BigInteger;
4 public class Factorial {
5     public static void main(String[] args) {
6         Scanner sc = new Scanner(System.in);
7         System.out.print("Enter a number");
8         int n = sc.nextInt();
9         BigInteger fact = BigInteger.ONE;
10        for(int i=2; i<=n; i++){
11            fact = fact.multiply(BigInteger.valueOf(i));
12        }
13        System.out.println(fact);
14        sc.close();
15    }
16 }
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```

```
J TrappingRainWater.java > TrappingRainWater > main(String[])
1 import java.util.*;
2 class TrappingRainWater{
    Run | Debug
3     public static void main(String[] args){
4         Scanner sc=new Scanner(System.in);
5
6         System.out.print(s:"Enter the no of elements");
7         int n=sc.nextInt();
8         int[] arr=new int[n];
9         System.out.println(x:"Enter the elements");
10        for(int i=0;i<n;i++){
11            arr[i]=sc.nextInt();
12        }
13        int result=0;
14        for(int i=0;i<arr.length;i++){
15            int left=arr[i];
16            for(int j=0;j<i;j++){
17                left=Math.max(left,arr[j]);
18            }
19            int right=arr[i];
20            for(int j=i;j<arr.length;j++){
21                right=Math.max(right,arr[j]);
22            }
23            result+=Math.min(left,right)-arr[i];
24        }
25        System.out.println(result);
26    }
27 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
ogram Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionM
5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_ws\java_f2597c95\bin' 'Trap
Enter the no of elements7
Enter the elements
3
0
1
0
4
0
2
10
```

Time Complexity: $O(n^2)$

7. Chocolate Distribution Problem

```
import java.util.*;

class ChocolateDistributionClass{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);

        System.out.print("Enter the no of elements");
        int num=sc.nextInt();
        int[] arr=new int[num];
        System.out.println("Enter the elements");
        for(int i=0;i<num;i++){
            arr[i]=sc.nextInt();
        }
        System.out.println("Enter the value of m");
        int m=sc.nextInt();
        Arrays.sort(arr);
```

```

        int mindiff=Integer.MAX_VALUE;
        int n=arr.length;
        for(int i=0;i+m-1<n;i++){
            int diff=arr[i+m-1]-arr[i];
            if(diff<mindiff){
                mindiff=diff;
            }
        }
        System.out.println(mindiff);
        sc.close();
    }
}

```

The screenshot shows a Java IDE with a file named `ChocolateDistribution.java`. The code defines a class `ChocolateDistributionClass` with a `main` method. The `main` method prompts the user to enter the number of elements, the elements themselves, and the value of `m`. It then sorts the array and finds the minimum difference between any two elements that are `m` positions apart. The terminal output shows the program running successfully with the following input and output:

```

Enter the no of elements7
Enter the elements
7
3
2
4
9
12
56
Enter the value of m
3
2

```

Time Complexity: $O(n \log n)$

8. Merge Overlapping Intervals

```

import java.util.*;

public class MergeOverlappingIntervals {

```



```

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.err.println("Enter the value of n");
    int n = sc.nextInt();
    int[][] arr = new int[n][2];
    System.err.println("Enter the elements");
    for (int i = 0; i < n; i++) {
        arr[i][0] = sc.nextInt();
        arr[i][1] = sc.nextInt();
    }
    Arrays.sort(arr, (a, b) -> a[0] - b[0]);
    List<List<Integer>> res = new ArrayList<>();
    for (int i = 0; i < n; i++) {
        if (res.isEmpty() || arr[i][0] > res.get(res.size() - 1).get(1)) {
            res.add(Arrays.asList(arr[i][0], arr[i][1]));
        } else {
            res.get(res.size() - 1).set(1, Math.max(res.get(res.size() - 1).get(1),
arr[i][1]));
        }
    }

    for (List<Integer> interval : res) {
        System.out.print "[" + interval.get(0) + ", " + interval.get(1) + " ] ";
    }
    System.out.println();

    sc.close();
}
}

```

The screenshot shows an IDE with the following code in `MergeOverlappingIntervals.java`:

```

1 import java.util.*;
2
3 public class MergeOverlappingIntervals {
4     public static void main(String[] args) {
5         Scanner sc = new Scanner(System.in);
6         System.err.println("Enter the value of n");
7         int n = sc.nextInt();
8         int[][] arr = new int[n][2];
9         System.err.println("Enter the elements");
10        for (int i = 0; i < n; i++) {
11            arr[i][0] = sc.nextInt();
12            arr[i][1] = sc.nextInt();
13        }
14        Arrays.sort(arr, (a, b) -> a[0] - b[0]);
15        List<List<Integer>> res = new ArrayList<>();
16        for (int i = 0; i < n; i++) {
17            if (res.isEmpty() || arr[i][0] > res.get(res.size() - 1).get(1)) {
18                res.add(Arrays.asList(arr[i][0], arr[i][1]));
19            } else {
20                res.get(res.size() - 1).set(1, Math.max(res.get(res.size() - 1).get(1),
21                arr[i][1]));
22            }
23        }
24
25        for (List<Integer> interval : res) {
26            System.out.print "[" + interval.get(0) + ", " + interval.get(1) + " ] ";
27        }
28        System.out.println();
29
30        sc.close();
31    }
32 }

```

The terminal output shows the execution of the program:

```

jdt-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\DELL\AppData
t.java\jdt_ws\java_f2597c95\bin' 'MergeOverlappingIntervals'
Enter the value of n
4
Enter the elements
1
3
2
4
6
8
9
10
[1, 4] [6, 8] [9, 10]

```

Time Complexity: $O(n \log n)$

9. Boolean Matrix

```
import java.util.Scanner;

class BooleanMatrix {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the number of rows: ");
        int m = sc.nextInt();
        System.out.print("Enter the number of columns: ");
        int n = sc.nextInt();
        int mat[][] = new int[m][n];
        System.out.println("Enter the elements:");
        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                mat[i][j] = sc.nextInt();
            }
        }
        int row[] = new int[m];
        int col[] = new int[n];
        for (int i = 0; i < m; i++) row[i] = 0;
        for (int i = 0; i < n; i++) col[i] = 0;
        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                if (mat[i][j] == 1) {
                    row[i] = 1;
                    col[j] = 1;
                }
            }
        }
    }
}
```

```

        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                if (row[i] == 1 || col[j] == 1) {
                    mat[i][j] = 1;
                }
            }
        }

        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                System.out.print(mat[i][j] + " ");
            }
            System.out.println();
        }
    }
    sc.close();
}
}

```

The screenshot shows an IDE with the file `BooleanMatrix.java` open. The code in the file is as follows:

```

1  import java.util.Scanner;
2
3  class BooleanMatrix {
4      public static void main(String[] args) {
5          Scanner sc = new Scanner(System.in);
6          System.out.print(s:"Enter the number of rows: ");
7          int m = sc.nextInt();
8          System.out.print(s:"Enter the number of columns: ");
9          int n = sc.nextInt();
10         int mat[][] = new int[m][n];
11         System.out.println(x:"Enter the elements:");
12         for (int i = 0; i < m; i++) {
13             for (int j = 0; j < n; j++) {
14                 mat[i][j] = sc.nextInt();
15             }
16         }
17         int row[] = new int[m];
18         int col[] = new int[n];
19         for (int i = 0; i < m; i++) {
20             for (int j = 0; j < n; j++) {
21                 row[i] = mat[i][j];
22                 col[j] = mat[i][j];
23             }
24         }
25         for (int i = 0; i < m; i++) {
26             for (int j = 0; j < n; j++) {
27                 if (row[i] == 1 || col[j] == 1) {
28                     mat[i][j] = 1;
29                 }
30             }
31         }
32         for (int i = 0; i < m; i++) {
33             for (int j = 0; j < n; j++) {
34                 System.out.print(mat[i][j] + " ");
35             }
36             System.out.println();
37         }
38     }
39     sc.close();
40 }
41 }

```

The terminal output shows the execution of the program:

```

PS C:\Users\DELL\Downloads\java> & 'C:\Program Files\Java\jdk-21\bin\java.exe'
ser\workspaceStorage\32e6e5f3cfc2e9dcc45df9f93849a3f5\redhat.java\jdt_ws\java_f
Enter the number of rows: 2
Enter the number of columns: 3
Enter the elements:
0
0
0
0
0
1
0 0 1
1 1 1

```

Time Complexity: $O(m*n)$

10. Print a given matrix in spiral form

```
import java.util.Scanner;

public class SpiralMatrix {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the number of rows: ");
        int m = sc.nextInt();
        System.out.print("Enter the number of columns: ");
        int n = sc.nextInt();
        int[][] mat = new int[m][n];
        System.out.println("Enter the elements");
        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                mat[i][j] = sc.nextInt();
            }
        }
        int top = 0, bottom = m - 1, left = 0, right = n - 1;
        while (top <= bottom && left <= right) {
            for (int i = left; i <= right; ++i) {
                System.out.print(mat[top][i] + " ");
            }
            top++;
            for (int i = top; i <= bottom; ++i) {
                System.out.print(mat[i][right] + " ");
            }
            right--;
            if (top <= bottom) {
                for (int i = right; i >= left; --i) {
                    System.out.print(mat[bottom][i] + " ");
                }
                bottom--;
            }
            if (left <= right) {
                for (int i = bottom; i >= top; --i) {
                    System.out.print(mat[i][left] + " ");
                }
                left++;
            }
        }
        sc.close();
    }
}
```

}

```

J SpiralMatrix.java > SpiralMatrix > main(String[])
1  import java.util.Scanner;
2
3  public class SpiralMatrix {
4      public static void main(String[] args) {
5          Scanner sc = new Scanner(System.in);
6          System.out.print("Enter the number of rows: ");
7          int m = sc.nextInt();
8          System.out.print("Enter the number of columns: ");
9          int n = sc.nextInt();
10         int[][] mat = new int[m][n];
11         System.out.println("Enter the elements");
12         for (int i = 0; i < m; i++) {
13             for (int j = 0; j < n; j++) {
14                 mat[i][j] = sc.nextInt();
15             }
16         }
17         int top = 0, bottom = m - 1, left = 0, right = n - 1;
18         while (top <= bottom && left <= right) {
19             // Spiral logic
20         }
21     }
22 }

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10

Time Complexity: $O(m*n)$

11. Check if given Parentheses expression is balanced or not

```
import java.util.*;
```

```

public class Parantheses {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a string");
        String s = sc.nextLine();
        Stack<Character> stack1 = new Stack<>();
        for (int i = 0; i < s.length(); i++) {
            if (s.charAt(i) == '(' || s.charAt(i) == '{' || s.charAt(i) == '[') {
                stack1.push(s.charAt(i));
            } else {
                if (!stack1.empty() &&
                    ((stack1.peek() == '(' && s.charAt(i) == ')') ||
                     (stack1.peek() == '{' && s.charAt(i) == '}') ||
                     (stack1.peek() == '[' && s.charAt(i) == ']'))) {
                    stack1.pop();
                } else {
                    System.out.println("false");
                }
            }
        }
    }
}

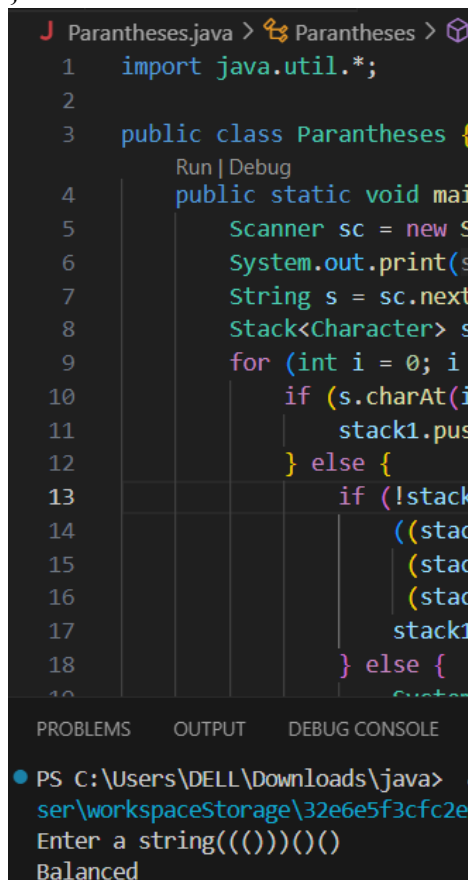
```

```

        sc.close();
        return;
    }
}

if (stack1.empty()) {
    System.out.println("Balanced");
} else {
    System.out.println("Not Balanced");
}
sc.close();
}
}

```



```

J Paratheses.java > Paratheses >
1  import java.util.*;
2
3  public class Paratheses {
4      public static void main(String[] args) {
5          Scanner sc = new Scanner(System.in);
6          System.out.print("Enter a string: ");
7          String s = sc.next();
8          Stack<Character> stack1 = new Stack<>();
9          for (int i = 0; i < s.length(); i++) {
10             if (s.charAt(i) == '(' || s.charAt(i) == '[' || s.charAt(i) == '{') {
11                 stack1.push(s.charAt(i));
12             } else {
13                 if (!stack1.isEmpty() && (s.charAt(i) == ')' && stack1.pop() == '(' ||
14                     s.charAt(i) == ']' && stack1.pop() == '[' ||
15                     s.charAt(i) == '}' && stack1.pop() == '{')) {
16                     continue;
17                 } else {
18                     System.out.println("Not Balanced");
19                     return;
20                 }
21             }
22         }
23         System.out.println("Balanced");
24     }
25 }

```

PROBLEMS OUTPUT DEBUG CONSOLE

PS C:\Users\DELL\Downloads\java> java -cp . Paratheses
Enter a string((()))()()
Balanced

Time Complexity: $O(n)$

12. Check if two Strings are Anagrams of each other

```

import java.util.Scanner;

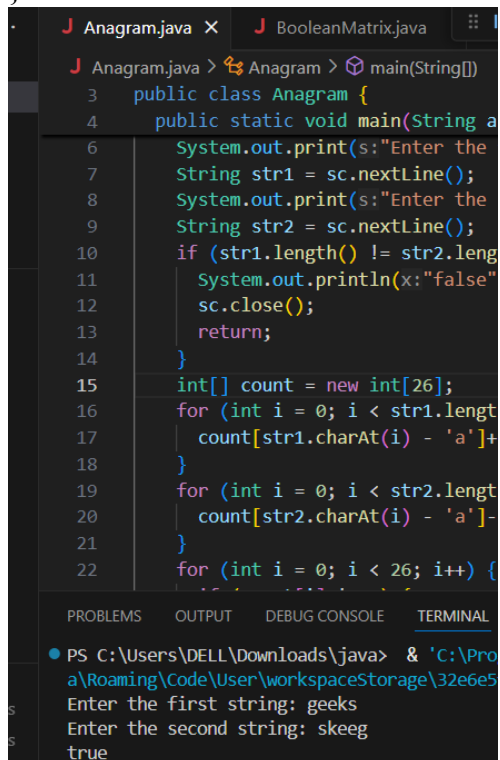
public class Anagram {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
    }
}

```

```

System.out.print("Enter the first string: ");
String str1 = sc.nextLine();
System.out.print("Enter the second string: ");
String str2 = sc.nextLine();
if (str1.length() != str2.length()) {
    System.out.println("false");
    sc.close();
    return;
}
int[] count = new int[26];
for (int i = 0; i < str1.length(); i++) {
    count[str1.charAt(i) - 'a']++;
}
for (int i = 0; i < str2.length(); i++) {
    count[str2.charAt(i) - 'a']--;
}
for (int i = 0; i < 26; i++) {
    if (count[i] != 0) {
        System.out.println("false");
        sc.close();
        return;
    }
}
System.out.println("true");
sc.close();
}
}

```



The screenshot shows a code editor with two tabs: 'Anagram.java' and 'BooleanMatrix.java'. The 'Anagram.java' tab is active, displaying the following code:

```

1 public class Anagram {
2     public static void main(String a
3
4
5
6     System.out.print(s:"Enter the
7     String str1 = sc.nextLine();
8     System.out.print(s:"Enter the
9     String str2 = sc.nextLine();
10    if (str1.length() != str2.leng
11        System.out.println(x:"false"
12        sc.close();
13        return;
14    }
15    int[] count = new int[26];
16    for (int i = 0; i < str1.lengt
17        count[str1.charAt(i) - 'a']+
18    }
19    for (int i = 0; i < str2.lengt
20        count[str2.charAt(i) - 'a']-
21    }
22    for (int i = 0; i < 26; i++) {

```

Below the code editor, the 'TERMINAL' tab is active, showing the execution of the program:

```

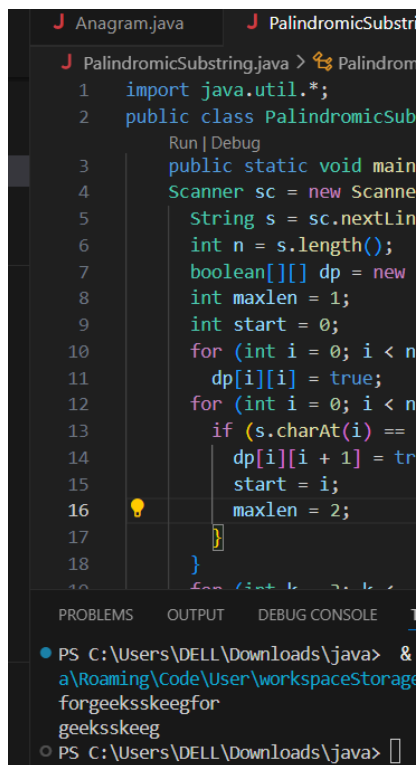
PS C:\Users\DELL\Downloads\java> & 'C:\Pro
a\Roaming\Code\User\workspaceStorage\32e6e5
Enter the first string: geeks
Enter the second string: skeeg
true

```

Time Complexity: $O(n)$

13. Longest Palindromic Substring

```
import java.util.*;
public class PalindromicSubstring {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String s = sc.nextLine();
        int n = s.length();
        boolean[][] dp = new boolean[n][n];
        int maxlen = 1;
        int start = 0;
        for (int i = 0; i < n; ++i)
            dp[i][i] = true;
        for (int i = 0; i < n - 1; ++i) {
            if (s.charAt(i) == s.charAt(i + 1)) {
                dp[i][i + 1] = true;
                start = i;
                maxlen = 2;
            }
        }
        for (int k = 3; k <= n; ++k) {
            for (int i = 0; i < n - k + 1; ++i) {
                int j = i + k - 1;
                if (dp[i + 1][j - 1] && s.charAt(i) == s.charAt(j)) {
                    dp[i][j] = true;
                    if (k > maxlen) {
                        start = i;
                        maxlen = k;
                    }
                }
            }
        }
        System.out.println(s.substring(start, start + maxlen));
        sc.close();
    }
}
```

```

J Anagram.java J PalindromicSubstr
J PalindromicSubstring.java > Palindrom
1 import java.util.*;
2 public class PalindromicSub
    Run | Debug
3     public static void main
4     Scanner sc = new Scanner
5     String s = sc.nextLin
6     int n = s.length();
7     boolean[][] dp = new
8     int maxlen = 1;
9     int start = 0;
10    for (int i = 0; i < n
11        dp[i][i] = true;
12    for (int i = 0; i < n
13        if (s.charAt(i) ==
14            dp[i][i + 1] = tr
15            start = i;
16        maxlen = 2;
17    }
18    }
19    for (int k = 2; k <= n
20        for (int i = 0; i <= n - k; i++)
21            if (s.charAt(i) == s.charAt(i + k - 1) && dp[i + 1][i + k - 1])
22                dp[i][i + k] = true;
23                start = i;
24                maxlen = i + k + 1;
25    }
26    System.out.println("Longest palindromic substring is: " + s.substring(start, start + maxlen));
27    }
28    }
PROBLEMS OUTPUT DEBUG CONSOLE
● PS C:\Users\DELL\Downloads\java> &
a\Roaming\Code\User\workspaceStorage
forgeeksskeegfor
geeksskeeg
○ PS C:\Users\DELL\Downloads\java>

```

Time Complexity: $O(n^2)$

14. Longest Common Prefix using Sorting

```
import java.util.Arrays;
import java.util.Scanner;

class CommonPrefix {
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);

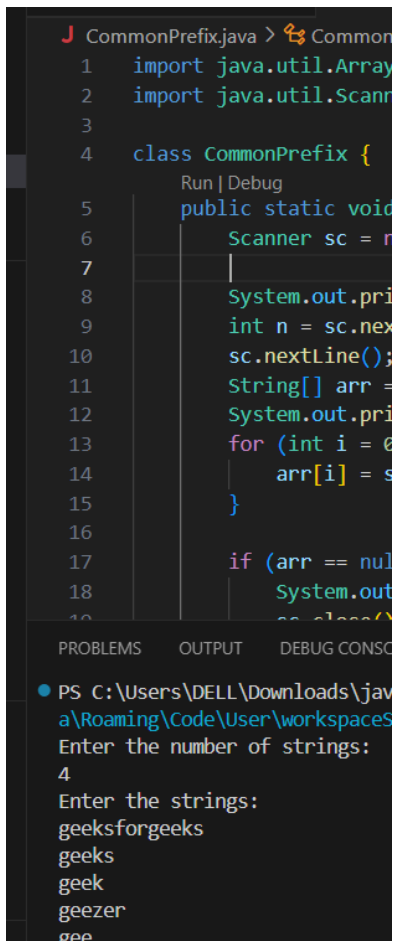
        System.out.println("Enter the number of strings:");
        int n = sc.nextInt();
        sc.nextLine();
        String[] arr = new String[n];
        System.out.println("Enter the strings:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextLine();
        }

        if (arr == null || arr.length == 0) {
            System.out.println("-1");
            sc.close();
            return;
        }
        Arrays.sort(arr);
    }
}
```

```

String start = arr[0];
String end = arr[arr.length - 1];
int minlen = Math.min(start.length(), end.length());
int i = 0;
while (i < minlen && start.charAt(i) == end.charAt(i)) {
    i++;
}
if (i == 0) {
    System.out.println("-1");
    sc.close();
} else {
    System.out.println(start.substring(0, i));
    sc.close();
}
}
}

```



```

CommonPrefix.java > Common
1  import java.util.Array
2  import java.util.Scann
3
4  class CommonPrefix {
5      Run | Debug
6      public static void
7          Scanner sc = n
8
9      System.out.pri
10     int n = sc.nex
11     sc.nextLine();
12     String[] arr =
13     System.out.pri
14     for (int i = 0
15         arr[i] = s
16     }
17
18     if (arr == nul
19     System.out
20     sc.close()

```

PROBLEMS OUTPUT DEBUG CONSOLE

```

PS C:\Users\DELL\Downloads\jav
a\Roaming\Code\User\workspacesS
Enter the number of strings:
4
Enter the strings:
geeksforgeeks
geeks
geek
geezer
gee

```

Time Complexity: $O(n \log n + m)$

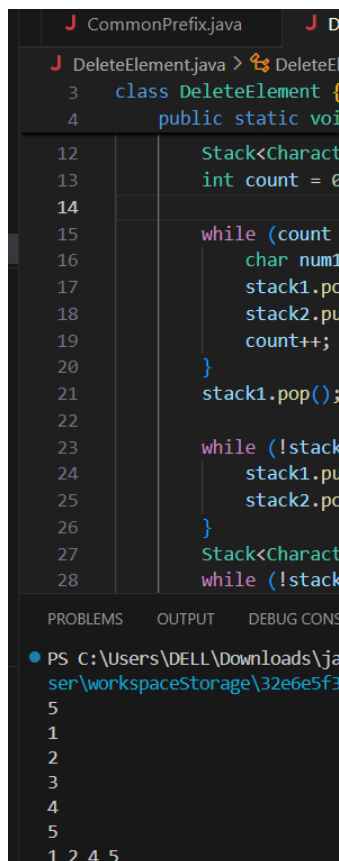
15. Delete middle element of a stack

```
import java.util.*;

class DeleteElement {
    public static void main(String args[]) {
        Scanner scanner = new Scanner(System.in);
        int n = scanner.nextInt();
        Stack<Character> stack1 = new Stack<>();
        for (int i = 0; i < n; i++) {
            stack1.push(scanner.next().charAt(0));
        }
        int size = stack1.size();
        Stack<Character> stack2 = new Stack<>();
        int count = 0;

        while (count < size / 2) {
            char num1 = stack1.peek();
            stack1.pop();
            stack2.push(num1);
            count++;
        }
        stack1.pop();

        while (!stack2.isEmpty()) {
            stack1.push(stack2.peek());
            stack2.pop();
        }
        Stack<Character> finalStack = new Stack<>();
        while (!stack1.isEmpty()) {
            finalStack.push(stack1.peek());
            stack1.pop();
        }
        while (!finalStack.isEmpty()) {
            char num2 = finalStack.peek();
            finalStack.pop();
            System.out.print(num2 + " ");
            scanner.close();
        }
    }
}
```



The screenshot shows an IDE with a Java file named 'DeleteElement.java'. The code defines a class 'DeleteElement' with a 'public static void' method. The code uses two stacks, 'stack1' and 'stack2', and a 'count' variable. It processes an input array by pushing elements onto 'stack1' until a 'while' loop condition is met, then popping elements from 'stack1' and pushing them onto 'stack2'. The output section shows the input array '5 1 2 3 4' and the resulting array '1 2 4 5'.

```
3 class DeleteElement {
4     public static void
12     Stack<Character>
13     int count = 0
14
15     while (count
16         char num1
17         stack1.po
18         stack2.pu
19         count++;
20     }
21     stack1.pop();
22
23     while (!stack
24         stack1.pu
25         stack2.pc
26     }
27     Stack<Character>
28     while (!stack
```

PROBLEMS OUTPUT DEBUG CONSOLE

PS C:\Users\DELL\Downloads\java\workspaceStorage\32e6e5f3

5
1
2
3
4
5
1 2 4 5

Time Complexity: $O(n)$

16. Next Greater Element

```
import java.util.Scanner;
import java.util.Stack;
```

```
public class NextGreaterElement {
```

```
    public static void NextGreaterElements(int[] arr) {
```

```
        int n = arr.length;
```

```
        int[] sol = new int[n];
```

```
        Stack<Integer> stack1 = new Stack<>();
```

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

```
            sol[i] = -1;
```

```
        }
```

```
        for (int i = n - 1; i >= 0; i--) {
```

```
            while (!stack1.isEmpty() && stack1.peek() <= arr[i]) {
```

```
                stack1.pop();
```

```
            }
```

```
            if (!stack1.isEmpty()) {
```

```

        sol[i] = stack1.peek();
    }

    stack1.push(arr[i]);
}

for (int i = 0; i < n; i++) {
    System.out.println(arr[i] + " --> " + (sol[i] != -1 ? sol[i] : "-1"));
}
}

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    int n = sc.nextInt();
    int[] arr = new int[n];
    for (int i = 0; i < n; i++) {
        arr[i] = sc.nextInt();
    }
    NextGreaterElements(arr);
    sc.close();
}
}

```

The screenshot shows an IDE with two tabs: 'DeleteElement.java' and 'NextGreaterElement.java'. The 'NextGreaterElement.java' tab is active, displaying the following code:

```

4  public class Next
6  public static
...
30 }
31
32 public static
33 Scanner s
34 int n = s
35 int[] arr
36 for (int
37     arr[i
38 }
39 NextGreat
40 sc.close(
41 }
42 }
43

```

Below the code editor, there are three tabs: 'PROBLEMS', 'OUTPUT', and 'DEBUG'. The 'OUTPUT' tab is selected, showing the following output:

```

4
4
5
2
25
4 --> 5
5 --> 25
2 --> 25
25 --> -1

```

Time Complexity: $O(n)$

17. Right View Of Binary Tree

```
import java.util.*;

class Node {
    int data;
    Node left, right;

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

public class RightViewBinaryTree {

    public static ArrayList<Integer> getRightView(Node rootNode) {
        ArrayList<Integer> ViewList = new ArrayList<>();
        if (rootNode == null) {
            return ViewList;
        }

        Queue<Node> queue1 = new LinkedList<>();
        queue1.add(rootNode);

        while (!queue1.isEmpty()) {
            int currentLevelSize = queue1.size();
            for (int i = 0; i < currentLevelSize; i++) {
                Node currentNode = queue1.poll();
                if (i == currentLevelSize - 1) {
                    ViewList.add(currentNode.data);
                }
                if (currentNode.left != null) {
                    queue1.add(currentNode.left);
                }
                if (currentNode.right != null) {
                    queue1.add(currentNode.right);
                }
            }
        }

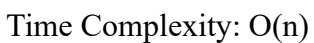
        return ViewList;
    }

    public static void main(String[] args) {
        Node tree1Root = new Node(1);
    }
}
```

```
ArrayList<Integer> tree1RightView = getRightView(tree1Root);
System.out.println(tree1RightView);

Node tree2Root = new Node(1);
tree2Root.left = new Node(2);
tree2Root.right = new Node(3);
tree2Root.left.left = new Node(4);
tree2Root.left.left.right = new Node(5);

ArrayList<Integer> tree2RightView = getRightView(tree2Root);
System.out.println(tree2RightView);
}
}
```



18. Maximum Depth or Height of Binary Tree

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

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

public class FindMaxDepth {

    public static int MaxDepth(Node rootNode) {
        if (rootNode == null) {
            return 0;
        }
        int leftHeight = MaxDepth(rootNode.left);
        int rightHeight = MaxDepth(rootNode.right);
        return Math.max(leftHeight, rightHeight) + 1;
    }

    public static void main(String[] args) {
        Node root1 = new Node(12);
        root1.left = new Node(8);
        root1.right = new Node(18);
        root1.left.left = new Node(5);
        root1.left.right = new Node(11);

        System.out.println(MaxDepth(root1));
    }
}
```



```

Node root2 = new Node(1);
root2.left = new Node(2);
root2.right = new Node(3);
root2.left.left = new Node(4);
root2.right.left = new Node(5);
root2.right.left.left = new Node(6);
root2.right.left.right = new Node(7);

System.out.println(MaxDepth(root2));
}
}

```

```

RightViewBinaryTree.java
FindMaxDepth.java
11 public class FindMaxDepth {
21 public static void main(String[] args) {
25     Node root1 = new Node(1);
26     root1.left = new Node(2);
27     root1.right = new Node(3);
28     System.out.println(MaxDepth(root1));
29 }
30 Node root2 = new Node(1);
31 root2.left = new Node(2);
32 root2.right = new Node(3);
33 root2.left.left = new Node(4);
34 root2.right.left = new Node(5);
35 root2.right.left.left = new Node(6);
36 root2.right.left.right = new Node(7);
37
38 System.out.println(MaxDepth(root2));
39 }
40 }
41
PROBLEMS OUTPUT DEBUG CONSOLE
PS C:\Users\DELL\Downloads\java> java -cp .\workspaceStorage\32e6e5f3cfd
3
4

```

Time Complexity: $O(n)$