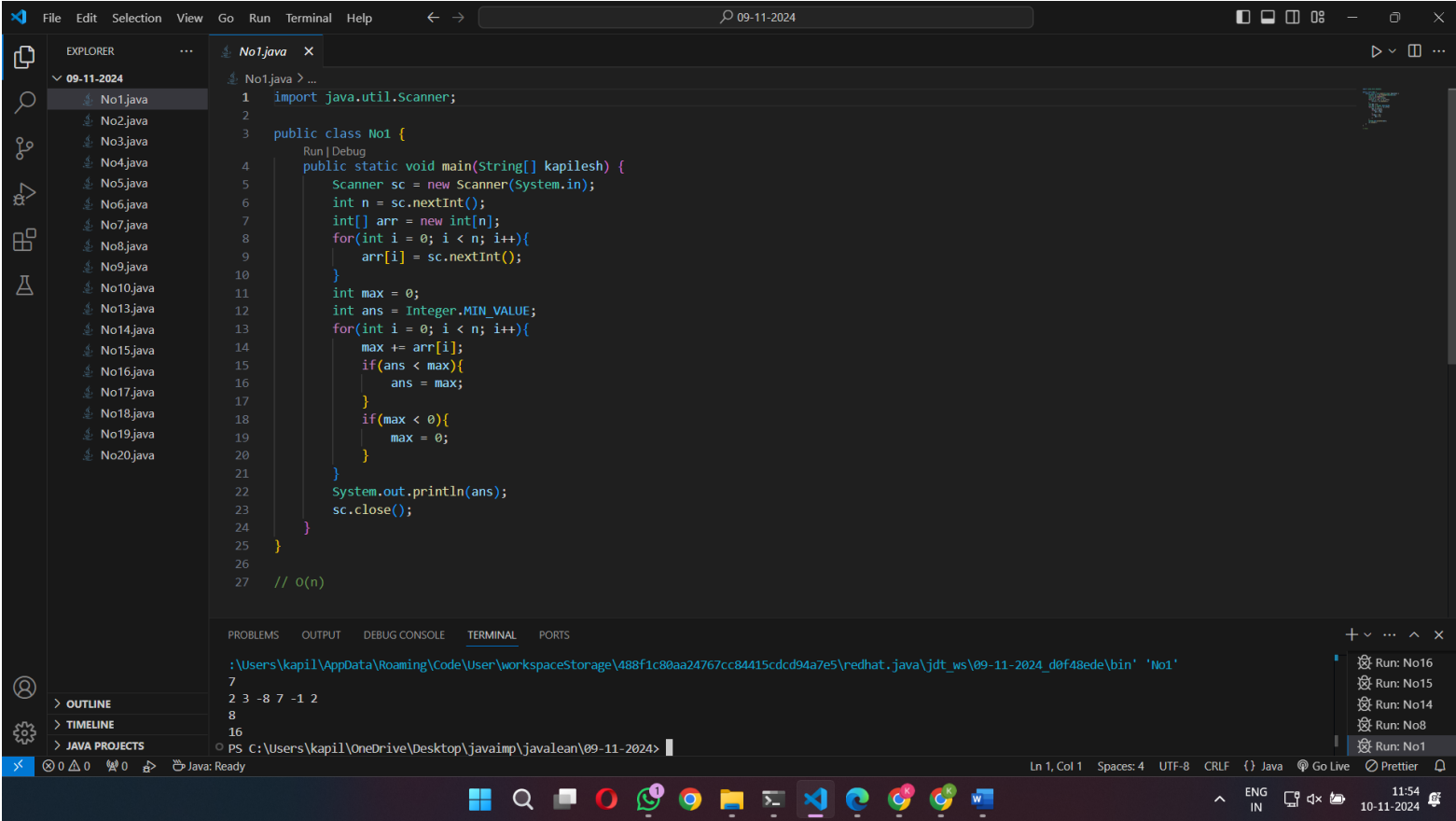
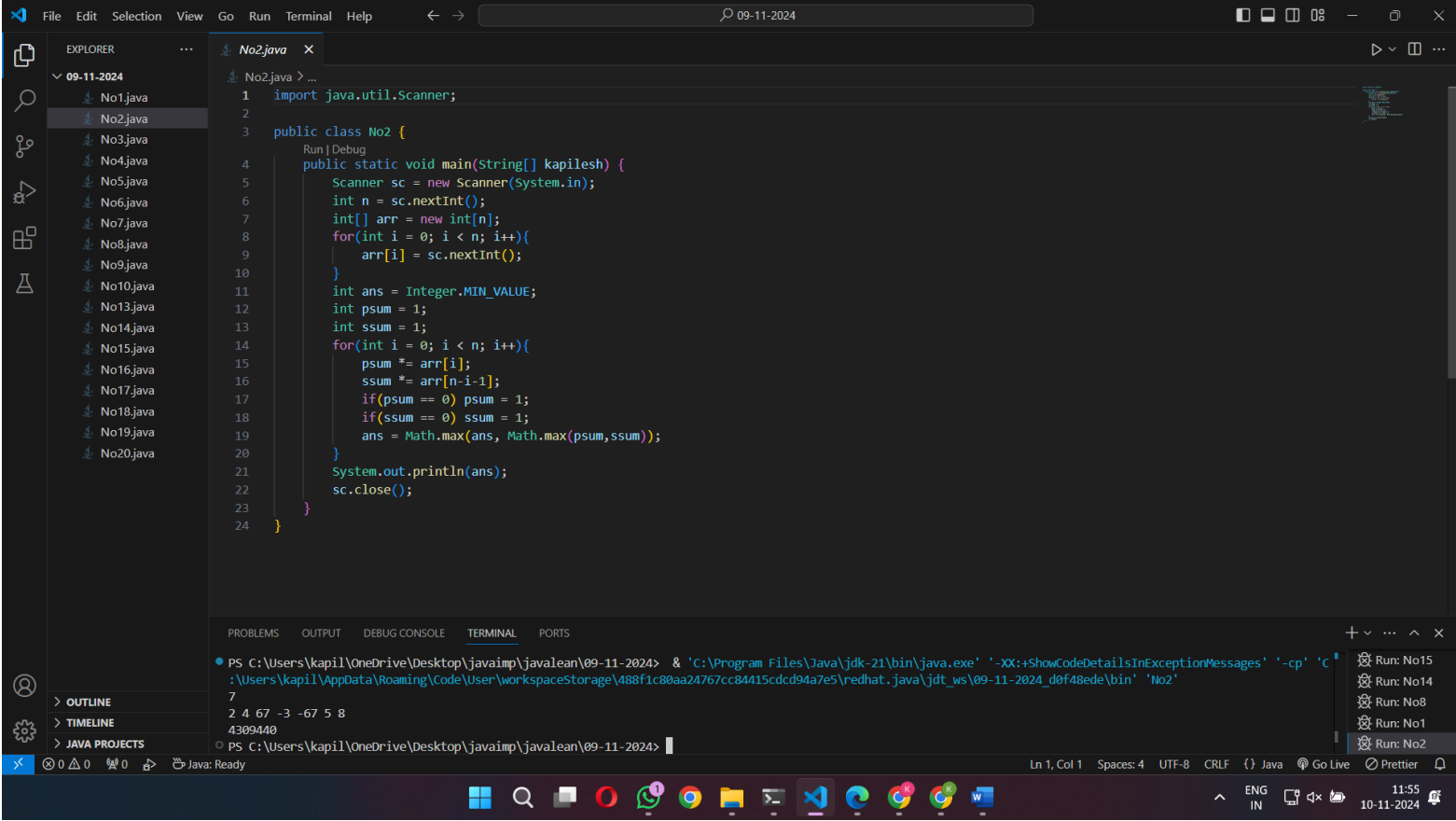


1)



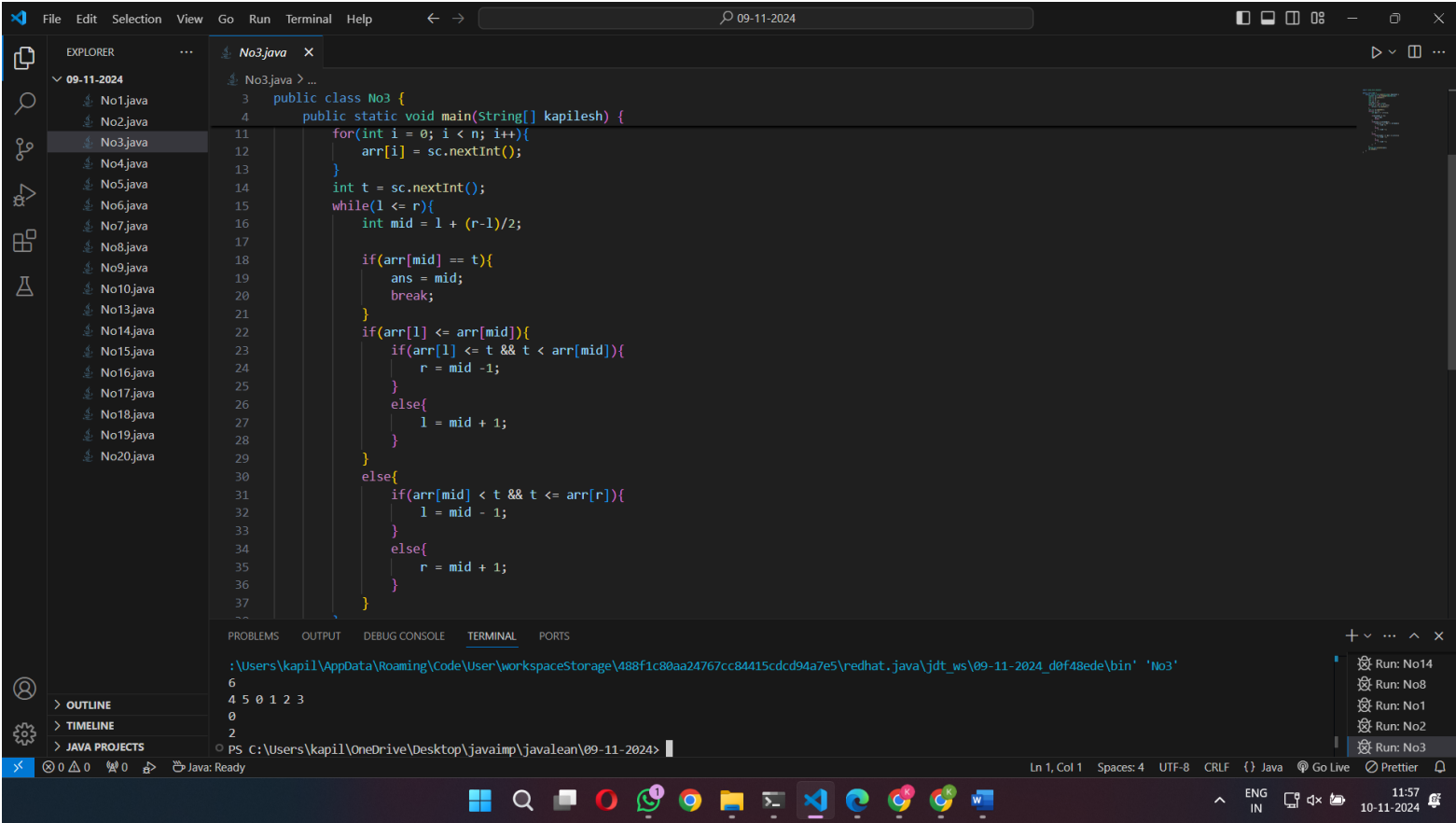
$O(n)$

2)



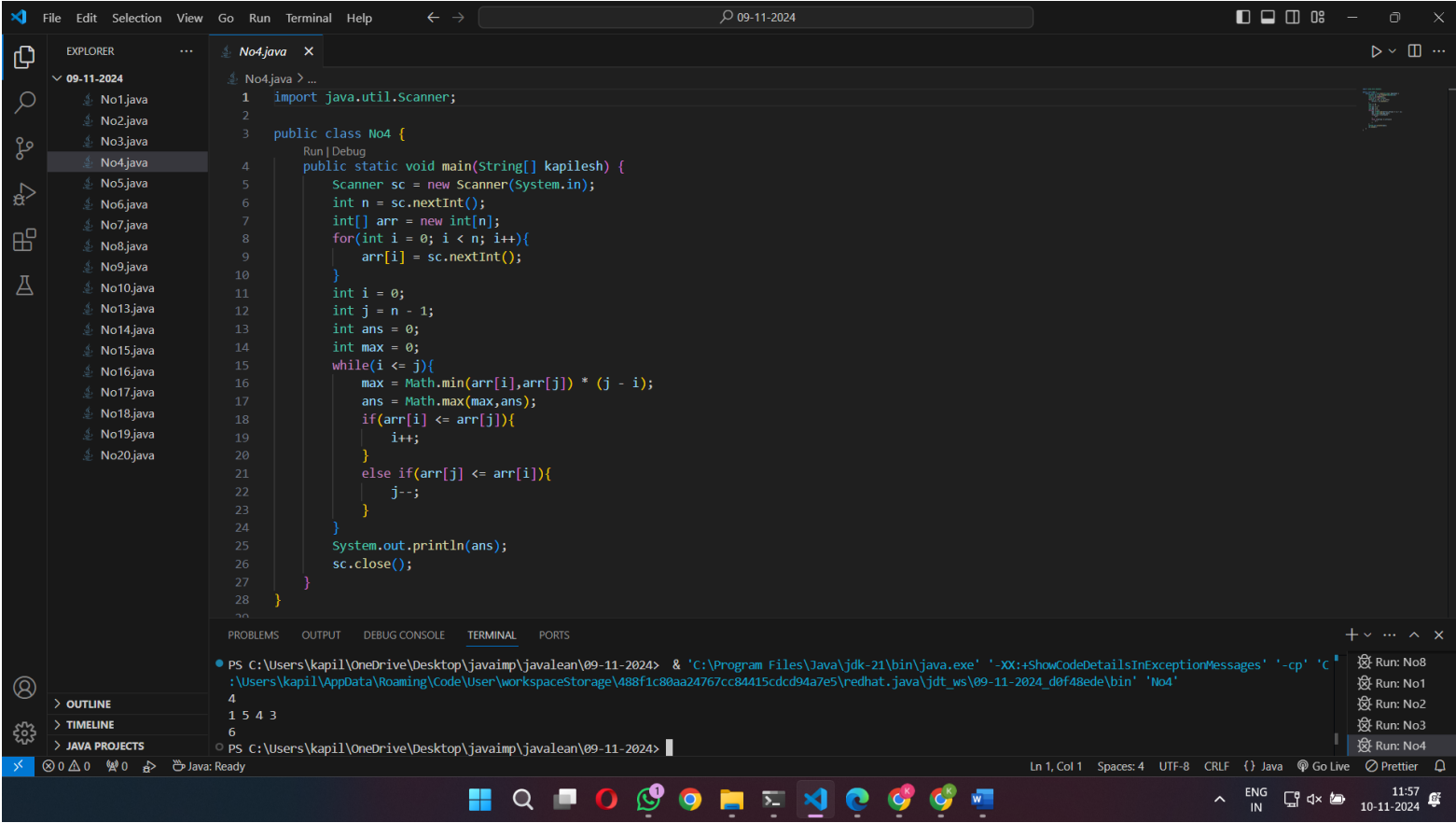
$O(n)$

3)



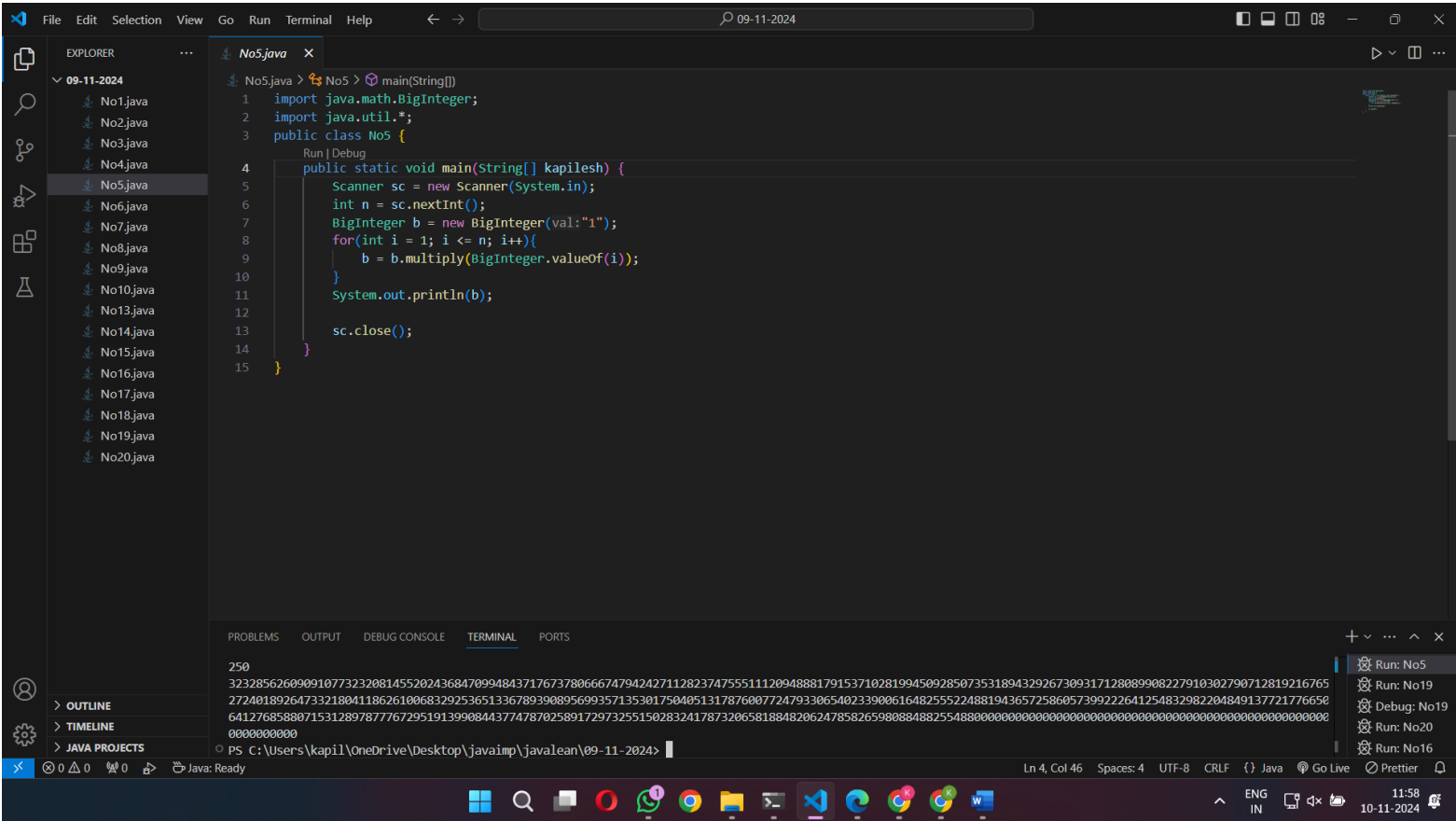
$O(\log n)$

4)

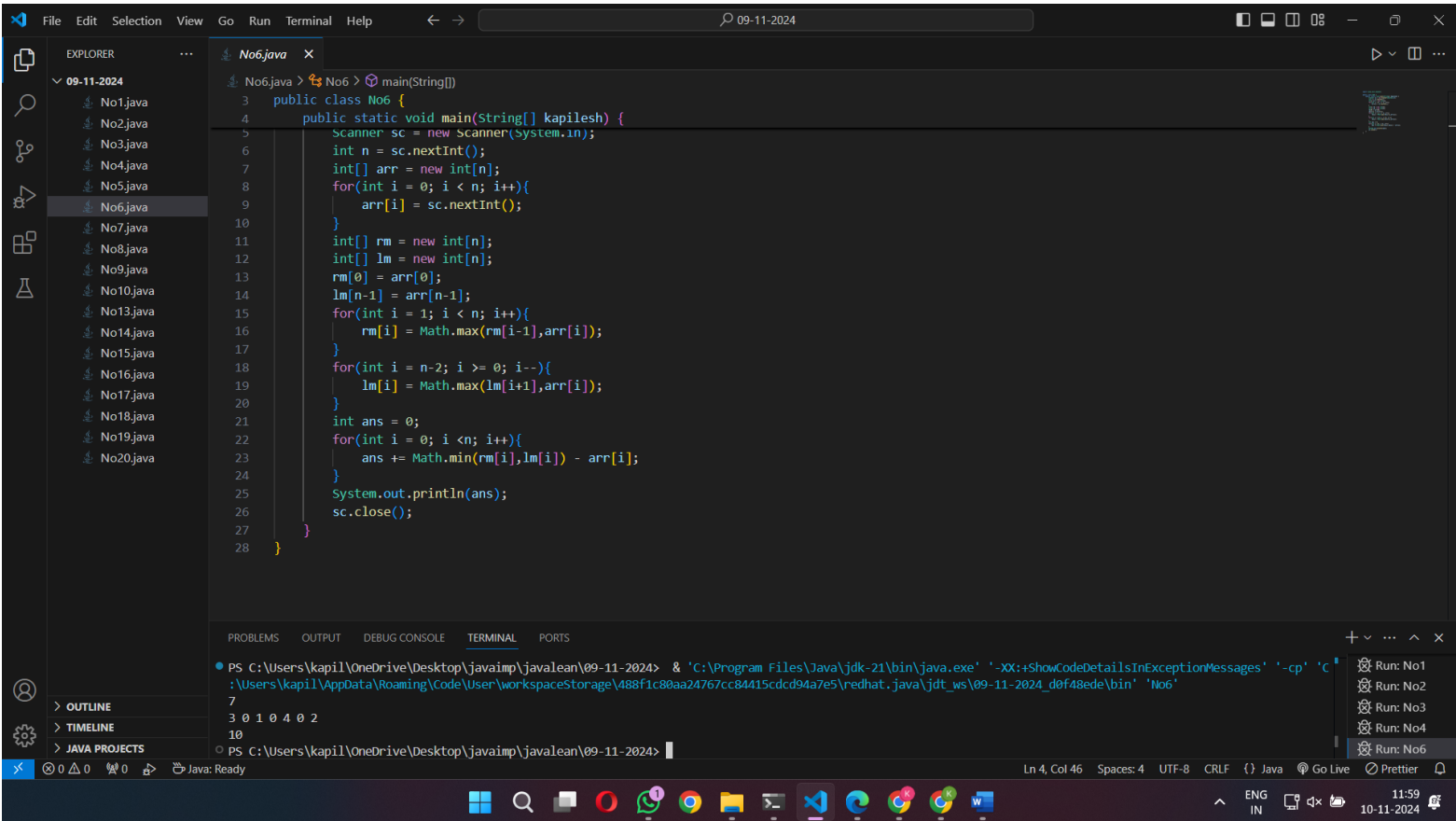


$O(n)$

5)

 $O(n)$ 

6)

 $O(n)$

7)

The screenshot shows the VS Code editor with a file explorer on the left containing files No1.java through No20.java. The main editor displays No7.java with the following code:

```
1 import java.util.*;
2 public class No7 {
3     public static void main(String[] kapilesh) {
4         Scanner sc = new Scanner(System.in);
5         int n = sc.nextInt();
6         int[] arr = new int[n];
7         for(int i = 0; i < n; i++){
8             arr[i] = sc.nextInt();
9         }
10        int m = sc.nextInt();
11        Arrays.sort(arr);
12        int ans = Integer.MAX_VALUE;
13        for(int i = 0; i + m - 1 < n; i++){
14            int min = arr[i+m-1] - arr[i];
15            ans = Math.min(ans,min);
16        }
17        System.out.println(ans);
18        sc.close();
19    }
20 }
21
```

The terminal at the bottom shows the command to run No7.java and its output:

```
: \Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\redhat.java\jdt_ws\09-11-2024_d0f48ede\bin' 'No7'
7
7 3 2 4 9 12 56
3
2
```

The status bar at the bottom indicates the file is at line 1, column 1, with 4 spaces, UTF-8 encoding, and CRLF line endings.

O(n logn)

8)

The screenshot shows the VS Code editor with a file explorer on the left containing files No1.java through No20.java. The main editor displays No8.java with the following code:

```
3 public class No8 {
4     static List<int[]> M(int[][] arr) {
5         int n = arr.length;
6
7         Arrays.sort(arr, (a, b) -> Integer.compare(a[0], b[0]));
8         List<int[]> res = new ArrayList<>();
9
10        for (int i = 0; i < n; i++) {
11            int start = arr[i][0];
12            int end = arr[i][1];
13
14            if (!res.isEmpty() && res.get(res.size() - 1)[1] >= end) {
15                continue;
16            }
17
18            for (int j = i + 1; j < n; j++) {
19                if (arr[j][0] <= end) {
20                    end = Math.max(end, arr[j][1]);
21                }
22            }
23            res.add(new int[]{start, end});
24        }
25        return res;
26    }
27    public static void main(String[] kapilesh) {
28        int[][] arr = {{7, 8}, {1, 5}, {2, 4}, {4, 6}};
29        List<int[]> res = M(arr);
30
31        for (int[] interval : res) {
32
33        }
34    }
35 }
```

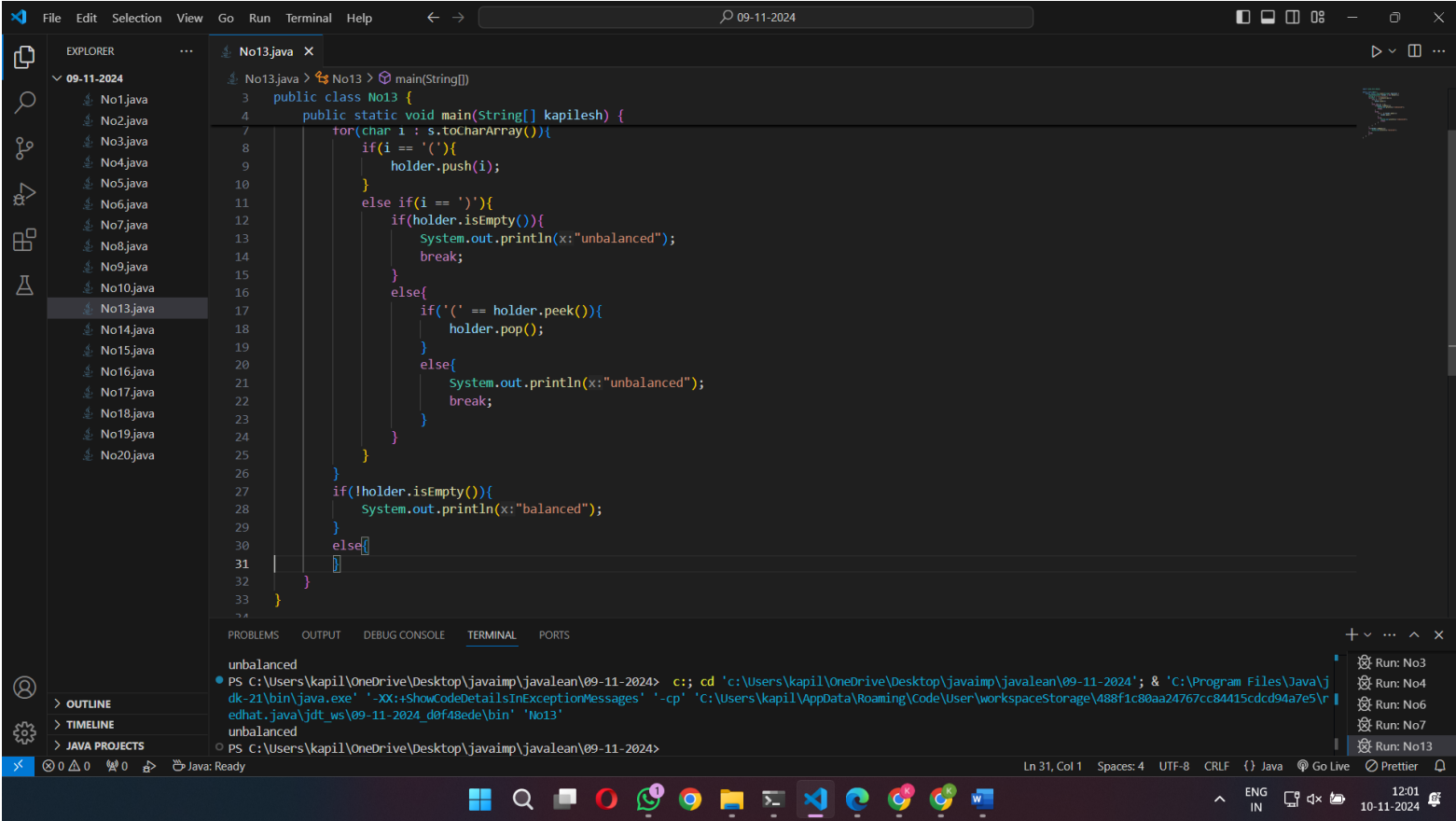
The terminal at the bottom shows the command to run No8.java and its output:

```
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> c:: cd 'c:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024'; & 'c:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\redhat.java\jdt_ws\09-11-2024_d0f48ede\bin' 'No8'
1 6
7 8
```

The status bar at the bottom indicates the file is at line 2, column 5, with 4 spaces, UTF-8 encoding, and CRLF line endings.

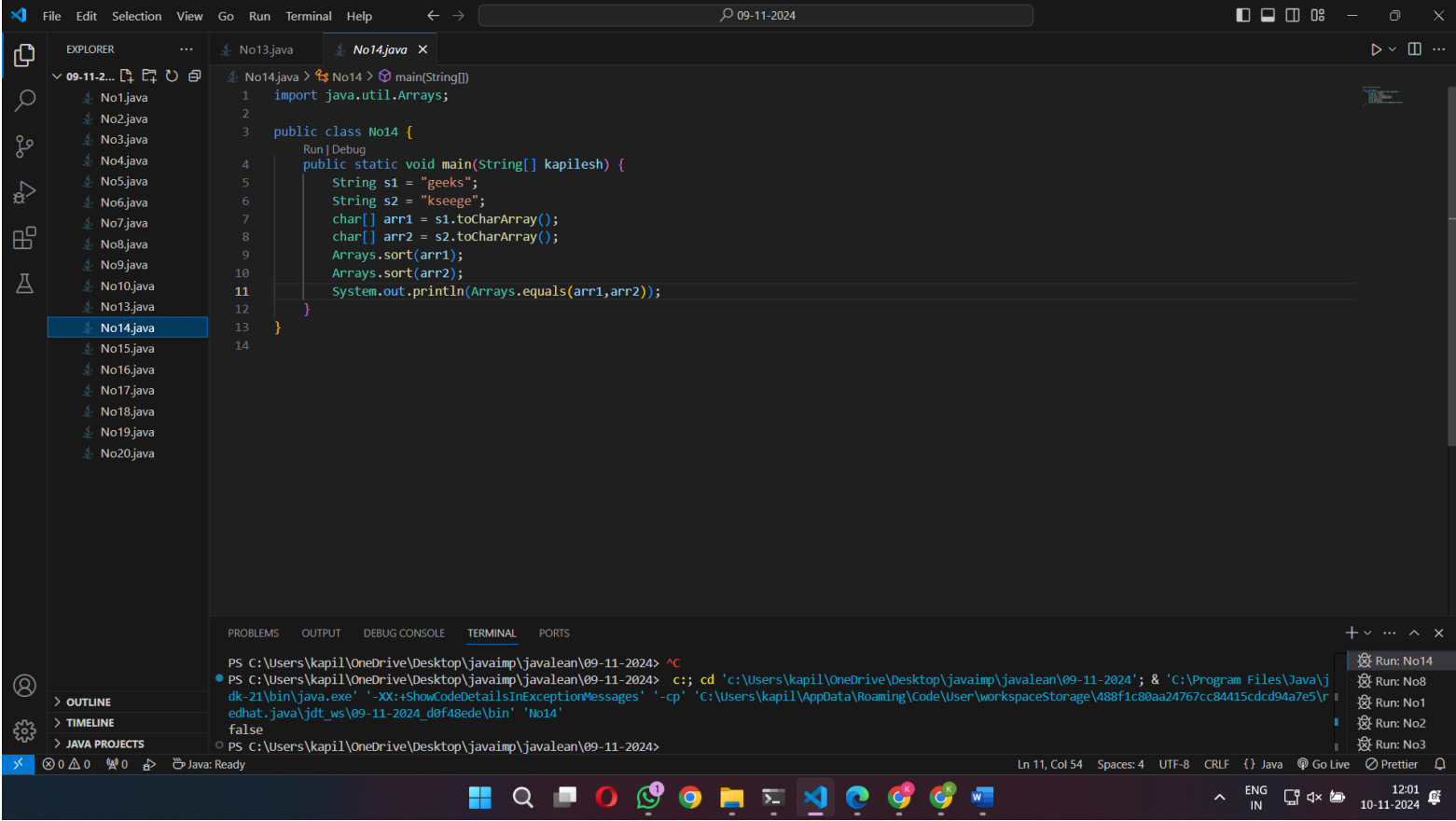
O(n logn)

13)



O(n)

14)



O(n)

15)

The screenshot shows the VS Code editor with the file `No15.java` open. The code implements a nested loop algorithm to find a substring. The `check` method uses two pointers, `l` and `r`, to check if a substring of length `m` exists. The `main` method reads input from the user and calls the `check` method.

```
1 public class No15 {
2     static boolean check(String s, int l, int r){
3         while(l < r){
4             l++;
5             r--;
6         }
7         return true;
8     }
9
10    public static void main(String[] kapilesh) {
11        Scanner sc = new Scanner(System.in);
12        String s = sc.next();
13        int m = 1;
14        int st = 0;
15        for(int i = 0; i < s.length(); i++){
16            for(int j = i; j < s.length(); j++){
17                if(check(s,i,j) && (j-i+1) > m){
18                    st = i;
19                    m = j - i + 1;
20                }
21            }
22        }
23        System.out.println(s.substring(st,st+m));
24        sc.close();
25    }
26 }
```

The terminal shows the command to run the program:

```
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> c:: cd 'c:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\edhat.java\jdt_ws\09-11-2024_d0f48ede\bin' 'No15'
```

$O(n^2)$

16)

The screenshot shows the VS Code editor with the file `No16.java` open. The code implements an algorithm to find a substring using sorting and binary search. The `main` method reads input from the user and calls the `check` method.

```
1 import java.util.*;
2 public class No16 {
3     public static void main(String[] kapilesh) {
4         Scanner sc = new Scanner(System.in);
5         int n = sc.nextInt();
6         String[] arr = new String[n];
7         for(int i = 0; i < n; i++){
8             arr[i] = sc.next();
9         }
10        Arrays.sort(arr);
11        String f = arr[0];
12        String l = arr[n-1];
13        int i = 0;
14        while(i < Math.min(f.length(), l.length()) && f.charAt(i) == l.charAt(i)){
15            i++;
16        }
17        if(i == 0){
18            System.out.print(-1);
19        }
20        System.out.println(f.substring(beginIndex:0,i));
21        sc.close();
22    }
23 }
```

The terminal shows the command to run the program:

```
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> va\jdt_ws\09-11-2024_d0f48ede\bin 'No16'
```

$O(n \log n + n*m)$

17)

FileEditSelectionViewGoRunTerminalHelp09-11-2024

EXPLORER

09-11-2...

No1.javaNo2.javaNo3.javaNo4.javaNo5.javaNo6.javaNo7.javaNo8.javaNo9.javaNo10.javaNo13.javaNo14.javaNo15.javaNo16.javaNo17.javaNo18.javaNo19.javaNo20.java

09-11-2...

No17.java

No17.java > No17 > main(String[])

3 public class No17 {  
4 static void delmid(Stack<Integer> holder, int n, int cu){  
5 if(holder.isEmpty() || cu == n){  
6 return;  
7 }  
8 int temp = holder.pop();  
9  
10 delmid(holder, n, cu+1);  
11  
12 if(cu != n/2){  
13 holder.push(temp);  
14 }  
15 }  
16  
17 Run | Debug  
18 public static void main(String[] kapilesh) {  
19 Stack<Integer> holder = new Stack<>();  
20 holder.push(item:1);  
21 holder.push(item:2);  
22 holder.push(item:3);  
23 holder.push(item:4);  
24 holder.push(item:5);  
25 holder.push(item:8);  
26  
27 delmid(holder,holder.size(),cu:0);  
28  
29 while(!holder.isEmpty()){  
30 System.out.println(holder.pop());  
31 }  
32 }  
33 }  
34 }  
35 }  
36 }  
37 }  
38 }  
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97 }  
98 }  
99 }  
100 }

PROBLEMSOUTPUTDEBUG CONSOLETERMINALPORTS

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PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024>

Ln 23, Col 24Spaces: 4UTF-8CRLF{}JavaGo LivePrettier12:0410-11-2024

O(n)

18)

FileEditSelectionViewGoRunTerminalHelp09-11-2024

EXPLORER

09-11-2024

No1.javaNo2.javaNo3.javaNo4.javaNo5.javaNo6.javaNo7.javaNo8.javaNo9.javaNo10.javaNo13.javaNo14.javaNo15.javaNo16.javaNo17.javaNo18.javaNo19.javaNo20.java

09-11-2024

No18.java

No18.java > No18 > main(String[])

3 public class No18 {  
4  
5 Run | Debug  
6 public static void main(String[] kapilesh) {  
7 Stack<Integer> holder = new Stack<>();  
8 Scanner sc = new Scanner(System.in);  
9 int n = sc.nextInt();  
10 int[] arr = new int[n];  
11 int[] ans = new int[n];  
12 for(int i = 0; i < n; i++){  
13 arr[i] = sc.nextInt();  
14 }  
15 for(int i = n-1; i >= 0; i--){  
16 while(!holder.isEmpty() && holder.peek() <= arr[i]){  
17 holder.pop();  
18 }  
19 if(!holder.isEmpty()){  
20 ans[i] = holder.peek();  
21 }  
22 else{  
23 ans[i] = -1;  
24 }  
25 holder.push(arr[i]);  
26 }  
27 for(int i = 0; i < n; i++){  
28 System.out.print(ans[i] + " ");  
29 }  
30 sc.close();  
31 }  
32 }  
33 }  
34 }  
35 }  
36 }  
37 }  
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39 }  
40 }  
41 }  
42 }  
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98 }  
99 }  
100 }

PROBLEMSOUTPUTDEBUG CONSOLETERMINALPORTS

PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\redhat.java\jdt\_ws\09-11-2024\_d0f48ede\bin' 'No18'  
4  
4 5 2 25  
5 25 25 -1  
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024>

Ln 18, Col 40Spaces: 4UTF-8CRLF{}JavaGo LivePrettier12:0410-11-2024

O(n)



19)

FileEditSelectionViewGoRunTerminalHelp09-11-2024

EXPLORER

09-11-2...

No1.javaNo2.javaNo3.javaNo4.javaNo5.javaNo6.javaNo7.javaNo8.javaNo9.javaNo10.javaNo13.javaNo14.javaNo15.javaNo16.javaNo17.javaNo18.javaNo19.javaNo20.java

09-11-2...

No19.javaNo20.java

No19.java

14 public class No19 {  
15 static void RR(Node root, int level, int[] maxlevel, ArrayList<Integer> result) {  
19 if (level > maxlevel[0]) {  
20 result.add(root.data);  
21 maxlevel[0] = level;  
22 }  
23 RR(root.right, level+1, maxlevel, result);  
24 RR(root.left, level+1, maxlevel, result);  
25 }  
26 static ArrayList<Integer> righttu(Node root) {  
27 ArrayList<Integer> result = new ArrayList<>();  
28 int[] maxlevel = new int[]{-1};  
29  
30 RR(root, level:0, maxlevel, result);  
31  
32 return result;  
33 }  
34 Run | Debug  
35 public static void main(String[] kapilesh) {  
36 Node root = new Node(d:1);  
37 root.left = new Node(d:2);  
38 root.right = new Node(d:3);  
39 root.right.left = new Node(d:4);  
40 root.right.right = new Node(d:5);  
41 root.right.right.right = new Node(d:8);  
42 ArrayList<Integer> ans = righttu(root);  
43  
44 System.out.println(ans);  
45 }  
46 }  
47 }  
48 }  
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99 }  
100 }

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> c:; cd 'c:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\rdhat.java\jdt\_ws\09-11-2024\_d0f48ede\bin' 'No19'  
[1, 3, 5, 8]  
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024>

Ln 31, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go Live Prettier

O(n)

20)

FileEditSelectionViewGoRunTerminalHelp09-11-2024

EXPLORER

09-11-2024

No1.javaNo2.javaNo3.javaNo4.javaNo5.javaNo6.javaNo7.javaNo8.javaNo9.javaNo10.javaNo13.javaNo14.javaNo15.javaNo16.javaNo17.javaNo18.javaNo19.javaNo20.java

09-11-2024

No19.javaNo20.java

No20.java

1 class Node {  
2 int data;  
3 Node left, right;  
4  
5 Node(int val) {  
6 data = val;  
7 left = null;  
8 right = null;  
9 }  
10 }  
11  
12  
13 public class No20 {  
14 static int D(Node node) {  
15 if (node == null)  
16 return 0;  
17  
18 int l = D(node.left);  
19 int r = D(node.right);  
20  
21 return Math.max(l, r) + 1;  
22 }  
23  
24 Run | Debug  
25 public static void main(String[] args) {  
26 Node root = new Node(val:1);  
27 root.left = new Node(val:2);  
28 root.right = new Node(val:3);  
29 root.left.left = new Node(val:4);  
30 }  
31 }  
32 }  
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34 }  
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41 }  
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95 }  
96 }  
97 }  
98 }  
99 }  
100 }

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> ^C  
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024> c:; cd 'c:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kapil\AppData\Roaming\Code\User\workspaceStorage\488f1c80aa24767cc84415cdcd94a7e5\rdhat.java\jdt\_ws\09-11-2024\_d0f48ede\bin' 'No20'  
4  
PS C:\Users\kapil\OneDrive\Desktop\javaimp\javalean\09-11-2024>

Ln 11, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go Live Prettier

O(n)