DSA PRACTICE PROBLEMS- DAY 9

NAME: Dhejan R
REG NO: 22IT022
DATE: 21/11/2024

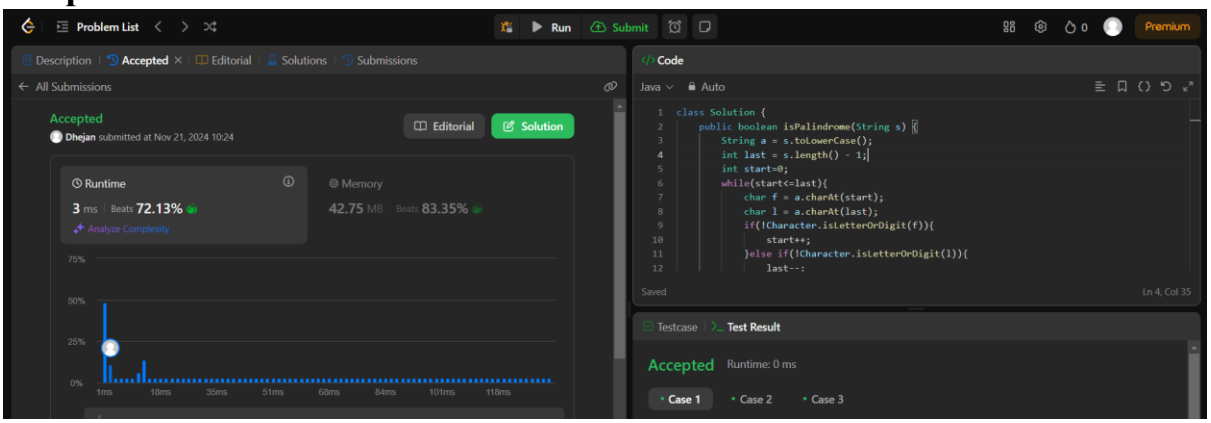
1. Valid Palindrome

Code Solution

```
class Solution {
    public boolean isPalindrome(String s) {
        String a = s.toLowerCase();
        int last = s.length() - 1;
        int start=0;
        while(start<=last){
            char f = a.charAt(start);
            char l = a.charAt(last);
            if(!Character.isLetterOrDigit(f)){
                start++;
            }else if(!Character.isLetterOrDigit(l)){
                last--;
            }else{
                if(f!=l)return false;

                start++;
                last--;
            }
        }
         return true;
    }
}
```

Output



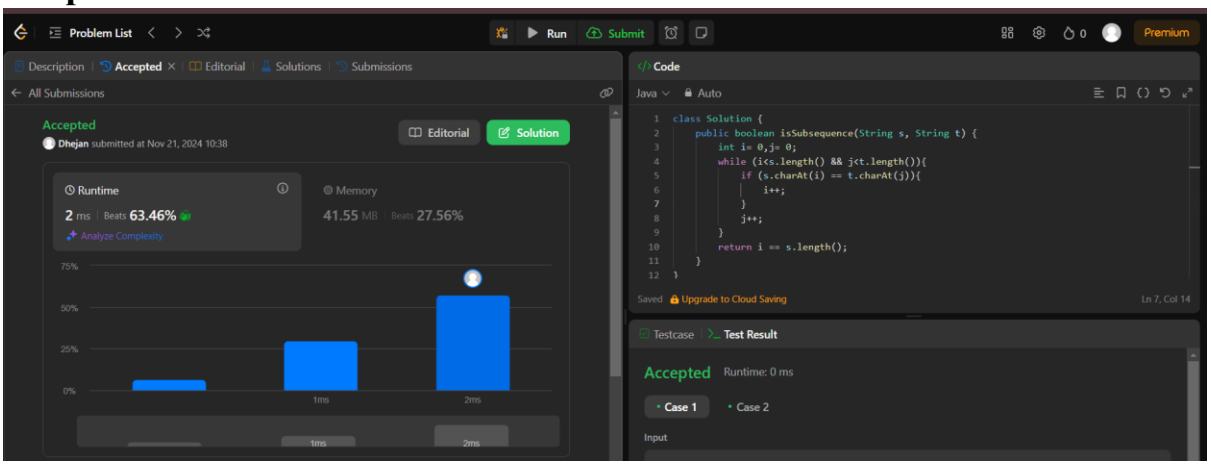
Time complexity: O(n)
Space complexity: O(1)

2. Is Subsequence

Code Solution

```
class Solution {
    public boolean isSubsequence(String s, String t) {
        int i= 0,j= 0;
        while (i<s.length() && j<t.length()){
            if (s.charAt(i) == t.charAt(j)){
                i++;
            }
            j++;
        }
        return i == s.length();
    }
}
```

Output



Time complexity: O(n+m)

Space complexity: O(1)

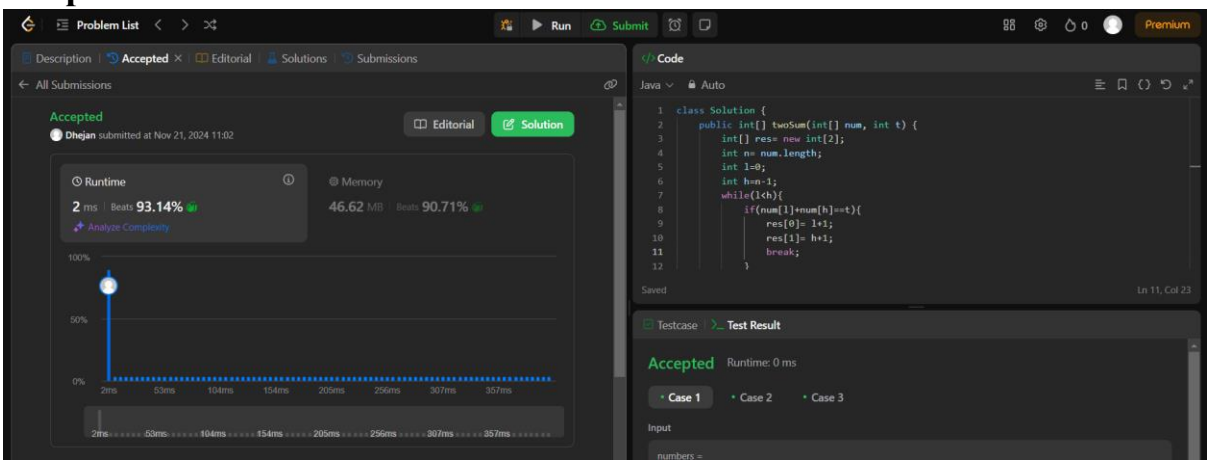
3. Two Sum II- Input array is sorted

Code Solution

```
class Solution {
    public int[] twoSum(int[] num, int t) {
        int[] res= new int[2];
        int n= num.length;
        int l=0;
        int h=n-1;
        while(l<h){
            if(num[l]+num[h]==t){
                res[0]= l+1;
                res[1]= h+1;
                break;
            }
            else if(num[l]+num[h]>t){
```

```
            h--;
        }else{
            l++;
        }
    }
    return res;
  }
}
```

Output



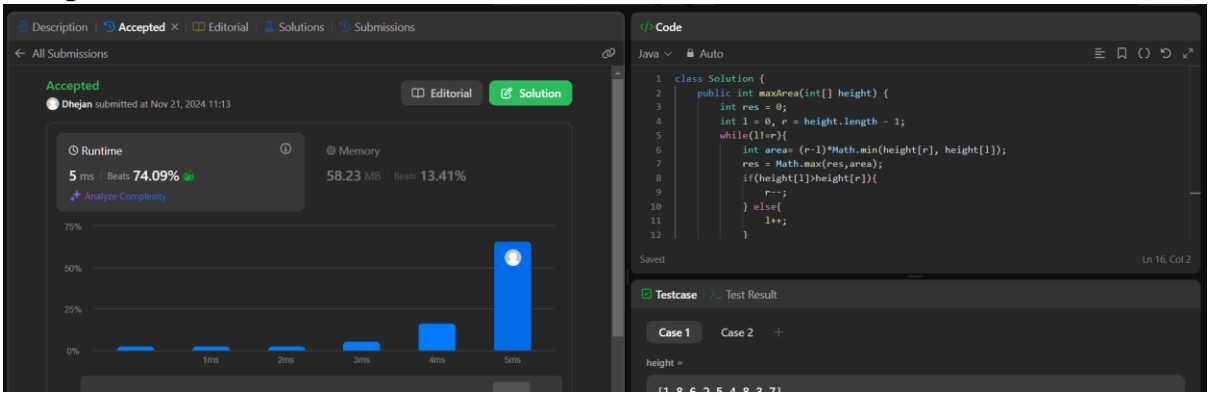
Time complexity: O(n)
Space complexity: O(1)

4. Container with most water

Code Solution

```
class Solution {
    public int maxArea(int[] height) {
        int res = 0;
        int l = 0, r = height.length - 1;
        while(l!=r){
            int area= (r-l)*Math.min(height[r], height[l]);
            res = Math.max(res,area);
            if(height[l]>height[r]){
                r--;
            } else{
                l++;
            }
        }
        return res;
    }
}
```

Output



Time complexity: O(n)
Space complexity: O(1)

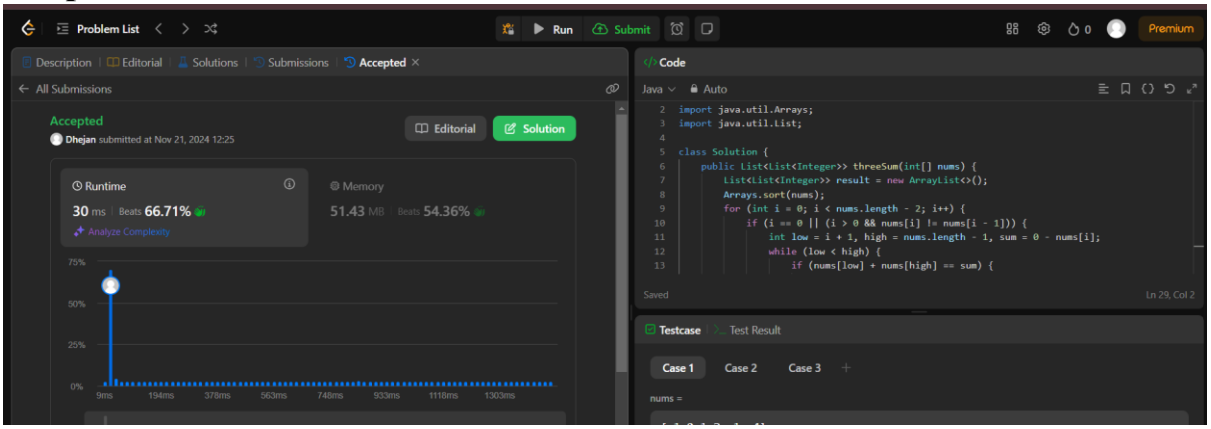
5. 3Sum

Code Solution

```
import java.util.ArrayList;
import java.util.Arrays;
import java.util.List;

class Solution {
    public List<List<Integer>> threeSum(int[] nums) {
        List<List<Integer>> result = new ArrayList<>();
        Arrays.sort(nums);
        for (int i = 0; i < nums.length - 2; i++) {
            if (i == 0 || (i > 0 && nums[i] != nums[i - 1])) {
                int low = i + 1, high = nums.length - 1, sum = 0 - nums[i];
                while (low < high) {
                    if (nums[low] + nums[high] == sum) {
                        result.add(Arrays.asList(nums[i], nums[low], nums[high]));
                        while (low < high && nums[low] == nums[low + 1]) low++;
                        while (low < high && nums[high] == nums[high - 1]) high--;
                        low++;
                        high--;
                    } else if (nums[low] + nums[high] < sum) {
                        low++;
                    } else {
                        high--;
                    }
                }
            }
        }
        return result;
    }
}
```

Output



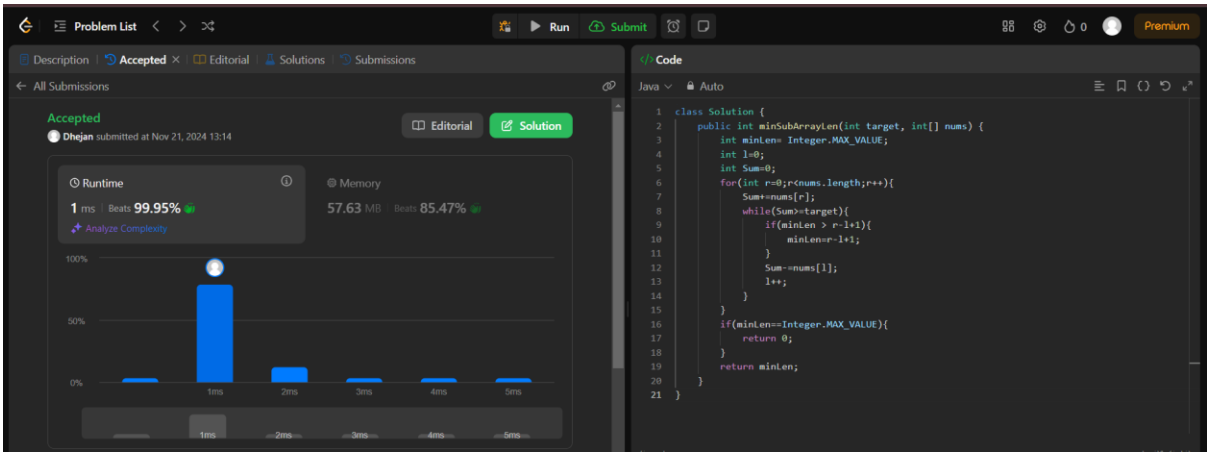
Time complexity: O(n^2)
Space complexity: O(n)

6. Minimum Size Subarray Sum

Code Solution

```
class Solution {
    public int minSubArrayLen(int target, int[] nums) {
        int minLen= Integer.MAX_VALUE;
        int l=0;
        int Sum=0;
        for(int r=0;r<nums.length;r++){
            Sum+=nums[r];
            while(Sum>=target){
                if(minLen > r-l+1){
                    minLen=r-l+1;
                }
                Sum-=nums[l];
                l++;
            }
        }
        if(minLen==Integer.MAX_VALUE){
            return 0;
        }
        return minLen;
    }
}
```

Output



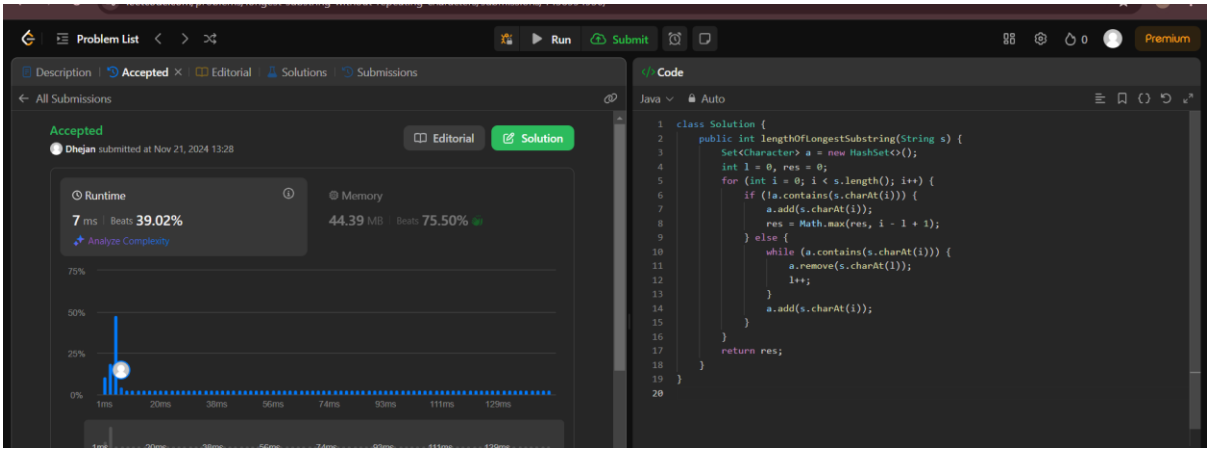
Time complexity: O(n)
Space complexity: O(1)

7. Longest Substring without repeating characters

Code Solution

```
class Solution {
    public int lengthOfLongestSubstring(String s) {
        Set<Character> a = new HashSet<>();
        int l = 0, res = 0;
        for (int i = 0; i < s.length(); i++) {
            if (!a.contains(s.charAt(i))) {
                a.add(s.charAt(i));
                res = Math.max(res, i - l + 1);
            } else {
                while (a.contains(s.charAt(i))) {
                    a.remove(s.charAt(l));
                    l++;
                }
                a.add(s.charAt(i));
            }
        }
        return res;
    }
}
```

Output



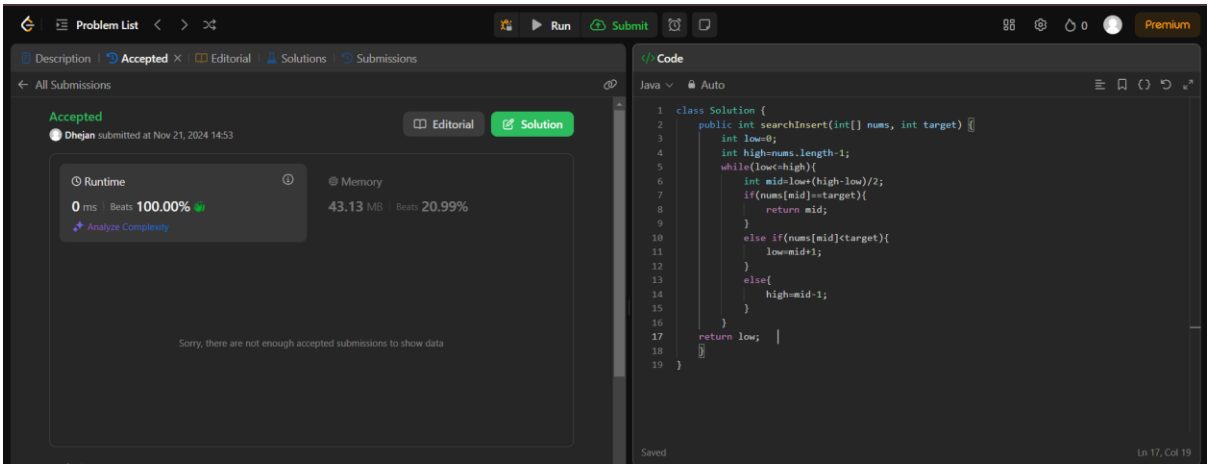
Time complexity: O(n)
Space complexity: O(n)

8. Search Insert Position

Code Solution

```
class Solution {
    public int searchInsert(int[] nums, int target) {
        int low=0;
        int high=nums.length-1;
        while(low<=high){
            int mid=low+(high-low)/2;
            if(nums[mid]==target){
                return mid;
            }
            else if(nums[mid]<target){
                low=mid+1;
            }
            else{
                high=mid-1;
            }
        }
    return low;
    }
}
```

Output



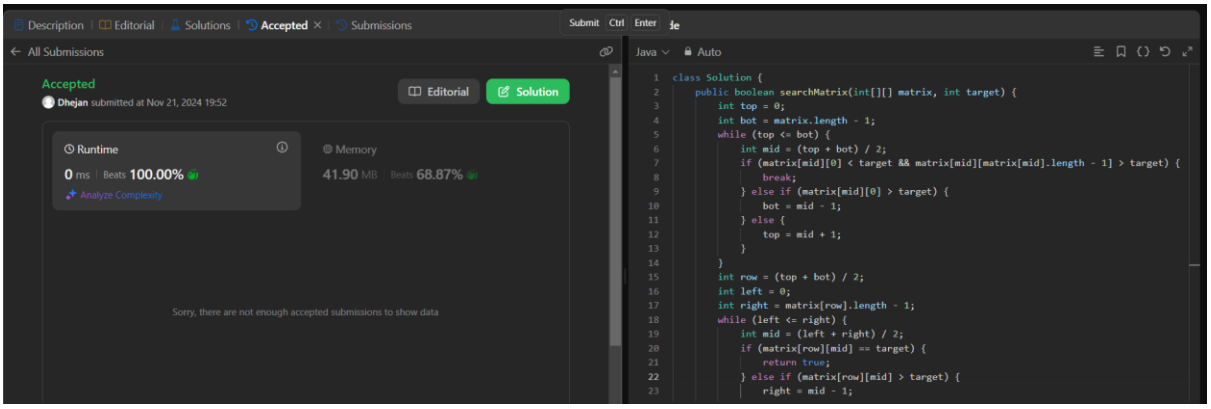
Time complexity: O(log n)
Space complexity: O(1)

9. Search in 2D Matrix

Code Solution

```
class Solution {
    public boolean searchMatrix(int[][] matrix, int target) {
        int top=0;
        int bot=matrix.length-1;
        while(top <= bot){
            int mid = (top + bot)/2;
            if(matrix[mid][0] < target && matrix[mid][matrix[mid].length - 1] > target){
                break;
            }else if(matrix[mid][0] > target){
                bot = mid-1;
            }else{
                top = mid + 1;
            }
        }
        int row =(top+bot)/2;
        int left = 0;
        int right = matrix[row].length-1;
        while(left<=right){
            int mid =(left+right)/2;
            if (matrix[row][mid] == target){
                return true;
            }else if(matrix[row][mid] > target){
                right = mid-1;
            }else{
                left = mid + 1;
            }
        }
        return false;
    }
```

}



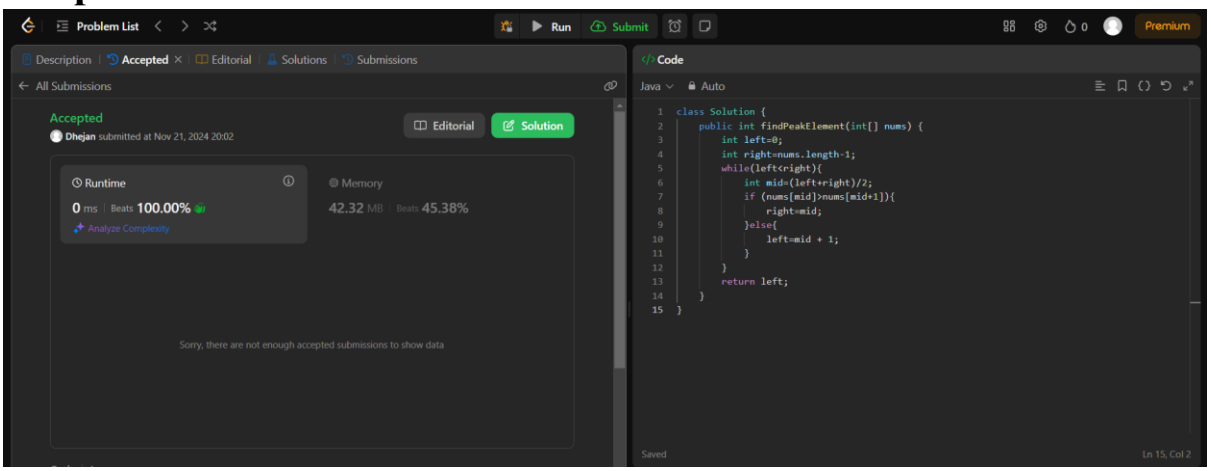
Time complexity: O(log(m*n))
Space complexity: O(1)

10. Find Peak Element

Code Solution

```
class Solution {
    public int findPeakElement(int[] nums) {
        int left=0;
        int right=nums.length-1;
        while(left<right){
            int mid=(left+right)/2;
            if (nums[mid]>nums[mid+1]){
                right=mid;
            }else{
                left=mid + 1;
            }
        }
        return left;
    }
}
```

Output



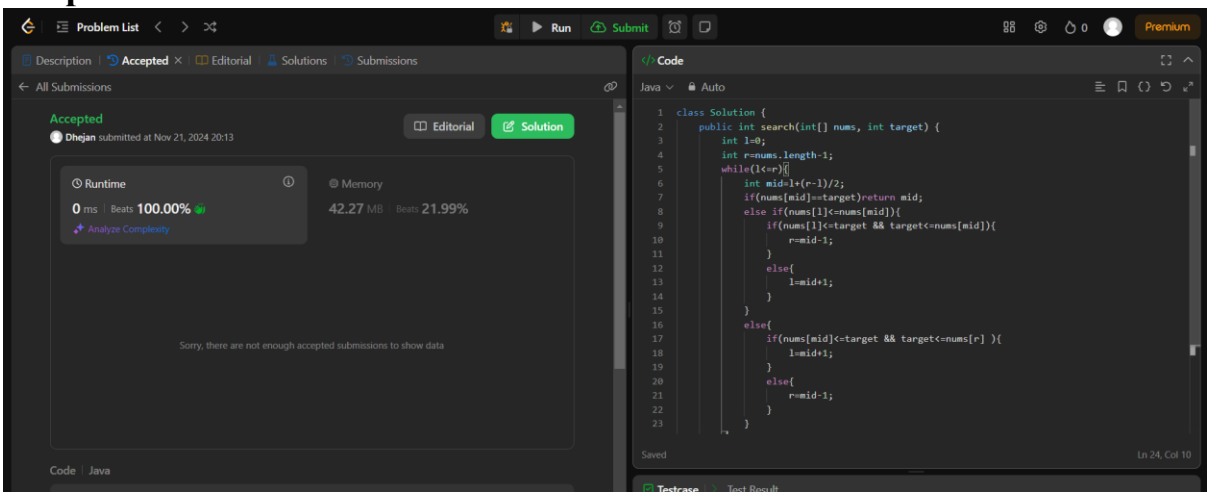
Time complexity: O(log n)
Space complexity: O(1)

11. Search in rotated sorted array

Code Solution

```
class Solution {
    public int search(int[] nums, int target) {
        int l=0;
        int r=nums.length-1;
        while(l<=r){
            int mid=l+(r-l)/2;
            if(nums[mid]==target)return mid;
            else if(nums[l]<=nums[mid]){
                if(nums[l]<=target && target<=nums[mid]){
                    r=mid-1;
                }
                else{
                    l=mid+1;
                }
            }
            else{
                if(nums[mid]<=target && target<=nums[r] ){
                    l=mid+1;
                }
                else{
                    r=mid-1;
                }
            }
        }
        return -1;
    }
}
```

Output



Time complexity: O(log n)
Space complexity: O(1)

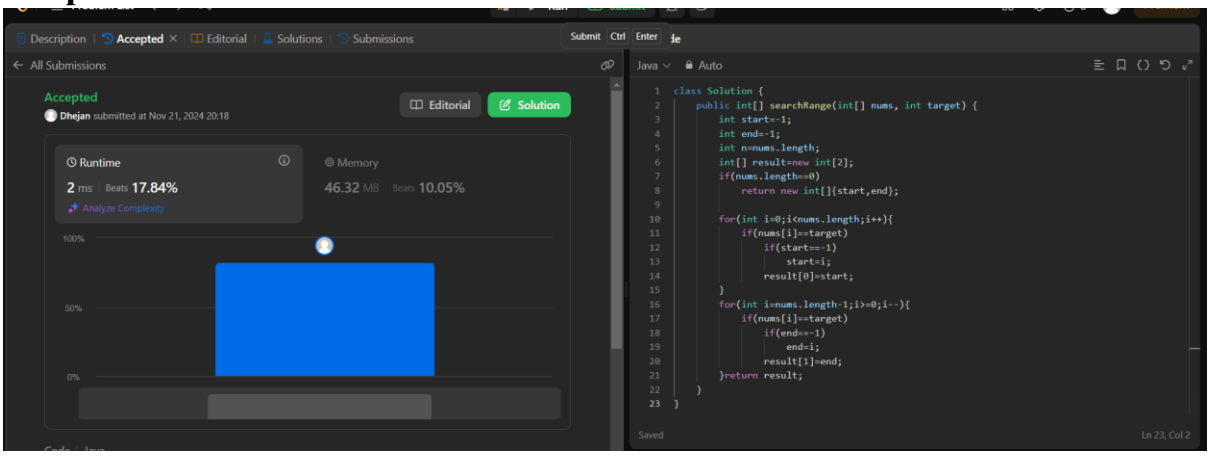
12. Find the first and last of element in the sorted array

Code Solution

```
class Solution {
    public int[] searchRange(int[] nums, int target) {
        int start=-1;
        int end=-1;
        int n=nums.length;
        int[] result=new int[2];
        if(nums.length==0)
            return new int[]{start,end};

        for(int i=0;i<nums.length;i++){
            if(nums[i]==target)
                if(start==-1)
                    start=i;
                result[0]=start;
        }
        for(int i=nums.length-1;i>=0;i--){
            if(nums[i]==target)
                if(end==-1)
                    end=i;
                result[1]=end;
        }return result;
    }
}
```

Output



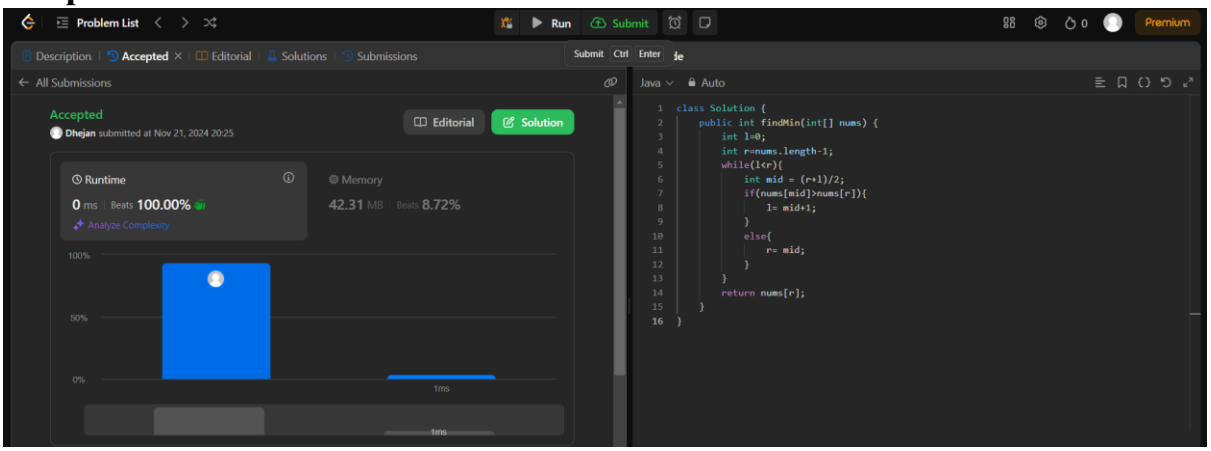
Time complexity: O(n)
Space complexity: O(1)

13. Find the minimum in the rotated sorted array

Code Solution

```
class Solution {
    public int findMin(int[] nums) {
        int l=0;
        int r=nums.length-1;
        while(l<r){
            int mid = (r+l)/2;
            if(nums[mid]>nums[r]){
                l= mid+1;
            }
            else{
                r= mid;
            }
        }
        return nums[r];
    }
}
```

Output



Time complexity: O(log n)

Space complexity: O(1)

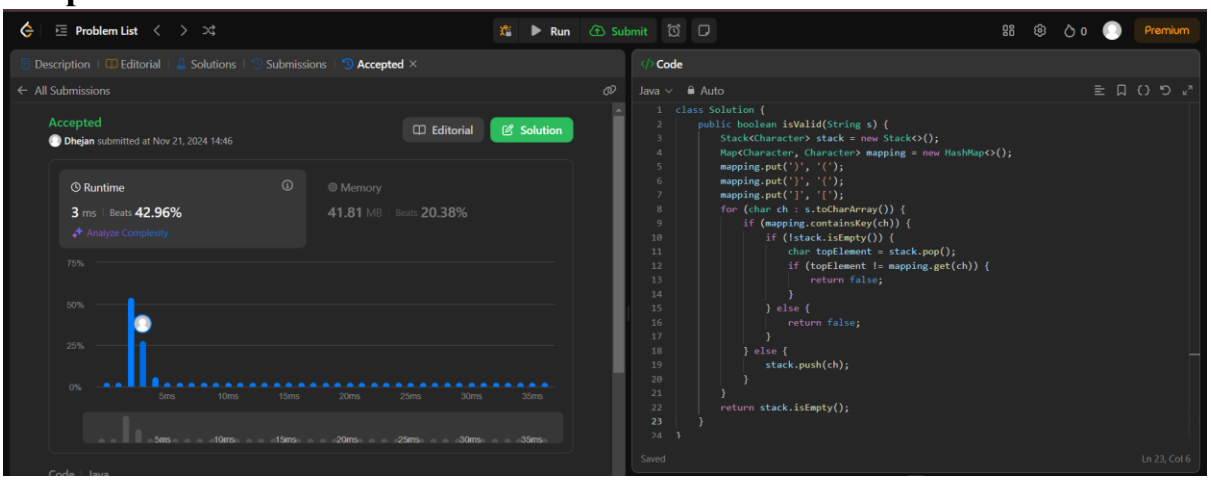
14. Valid Parantheses

Code Solution

```
class Solution {
    public boolean isValid(String s) {
        Stack<Character> stack = new Stack<>();
        Map<Character, Character> mapping = new HashMap<>();
        mapping.put(')', '(');
        mapping.put('}', '{');
        mapping.put(']', '[');
        for (char ch : s.toCharArray()) {
            if (mapping.containsKey(ch)) {
```

```
            if (!stack.isEmpty()) {
                char topElement = stack.pop();
                if (topElement != mapping.get(ch)) {
                    return false;
                }
            } else {
                return false;
            }
        } else {
            stack.push(ch);
        }
    }
    return stack.isEmpty();
  }
}
```

Output



Time complexity: O(n)
Space complexity: O(n)

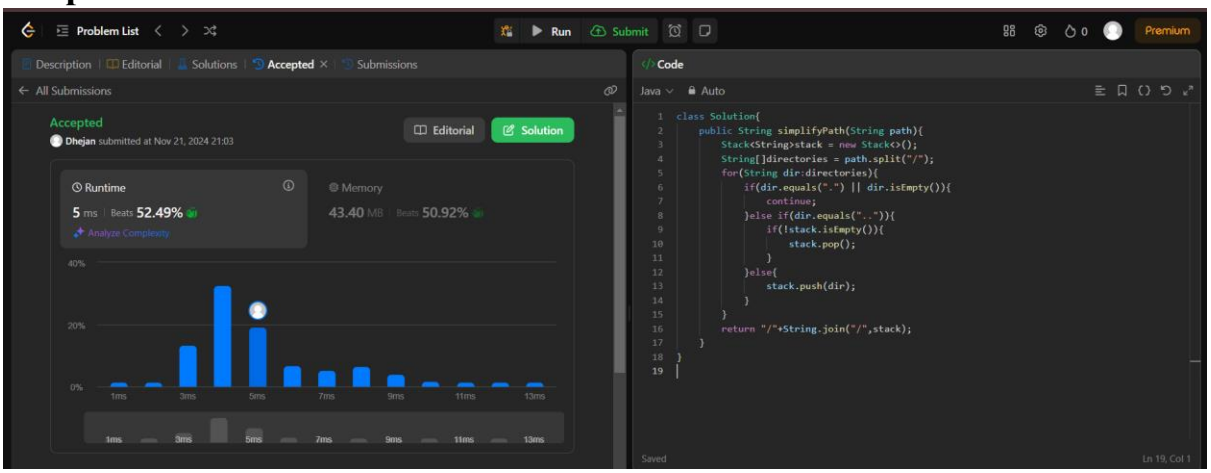
15. Simplify Path

Code Solution

```
class Solution{
   public String simplifyPath(String path){
      Stack<String>stack = new Stack<>();
      String[]directories = path.split("/");
      for(String dir:directories){
         if(dir.equals(".") || dir.isEmpty()){
            continue;
         }else if(dir.equals("..")){
            if(!stack.isEmpty()){
               stack.pop();
            }
         }else{
```

```
            stack.push(dir);
        }
    }
    return "/"+String.join("/",stack);
  }
}
```

Output



Time complexity: O(n)
Space complexity: O(n)

16. Min stack

Code Solution

```
class MinStack{
    private List<int[]>st;

    public MinStack(){
        st=new ArrayList<>();
    }

    public void push(int val){
        int[]top;
        if(st.isEmpty()){
            top=new int[]{val,val};
        }else{
            top=st.get(st.size()-1);
        }
        int min_val=top[1];
        if(min_val>val){
            min_val=val;
        }
        st.add(new int[]{val,min_val});
    }
```

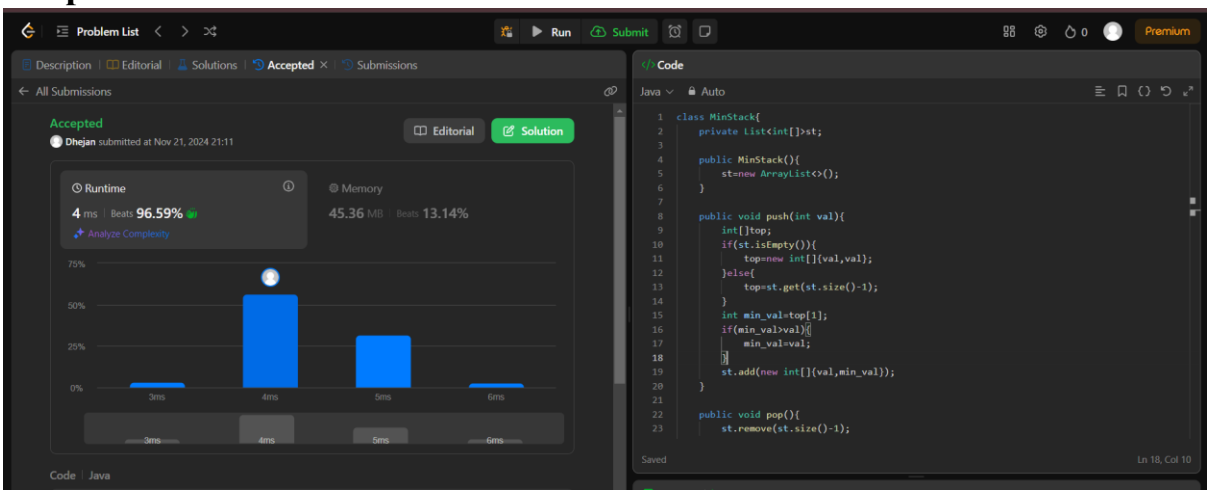
```
    public void pop(){
        st.remove(st.size()-1);
    }

    public int top(){
        if(st.isEmpty()){
            return -1;
        }else{
            return st.get(st.size()-1)[0];
        }
    }

    public int getMin(){
        if(st.isEmpty()){
            return -1;
        }else{
            return st.get(st.size()-1)[1];
        }
    }
}

/**
 * Your MinStack object will be instantiated and called as such:
 * MinStack obj = new MinStack();
 * obj.push(val);
 * obj.pop();
 * int param_3 = obj.top();
 * int param_4 = obj.getMin();
 */
```

Output



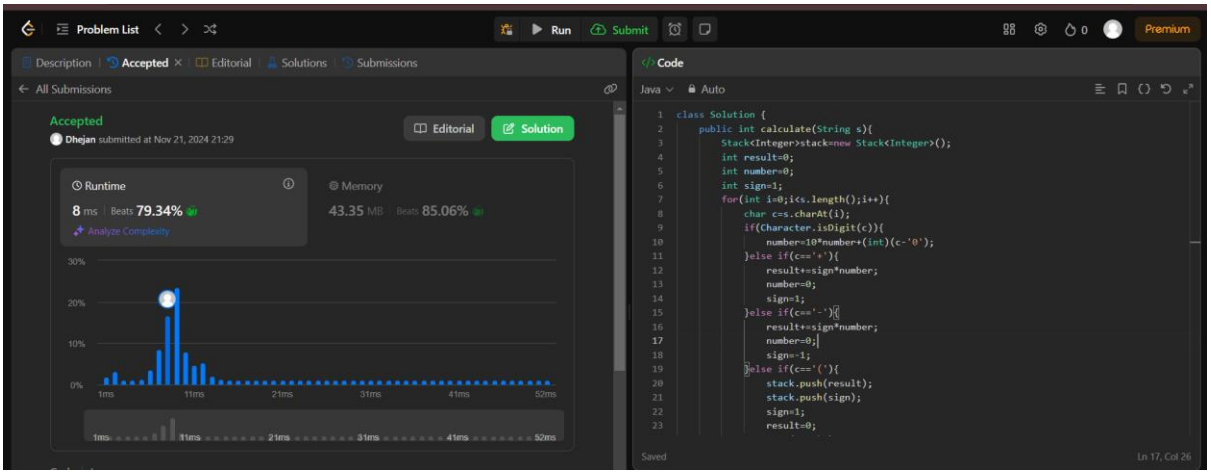
Time complexity: O(1)
Space complexity: O(n)

17. Basic Calculator

Code Solution

```
class Solution {
    public int calculate(String s){
        Stack<Integer>stack=new Stack<Integer>();
        int result=0;
        int number=0;
        int sign=1;
        for(int i=0;i<s.length();i++){
            char c=s.charAt(i);
            if(Character.isDigit(c)){
                number=10*number+(int)(c-'0');
            }else if(c=='+'){
                result+=sign*number;
                number=0;
                sign=1;
            }else if(c=='-'){
                result+=sign*number;
                number=0;
                sign=-1;
            }else if(c=='('){
                stack.push(result);
                stack.push(sign);
                sign=1;
                result=0;
            }else if(c==')'){
                result+=sign*number;
                number=0;
                result*=stack.pop();
                result+=stack.pop();
            }
        }
        if(number!=0) result+=sign*number;
        return result;
    }
}
```

Output



Time complexity: O(n)
Space complexity: O(n)