SRI VASAVI ENGINEERING COLLEGE (Autonomous)

PEDATADEPALLI, TADEPALLIGUDEM.

Certificate

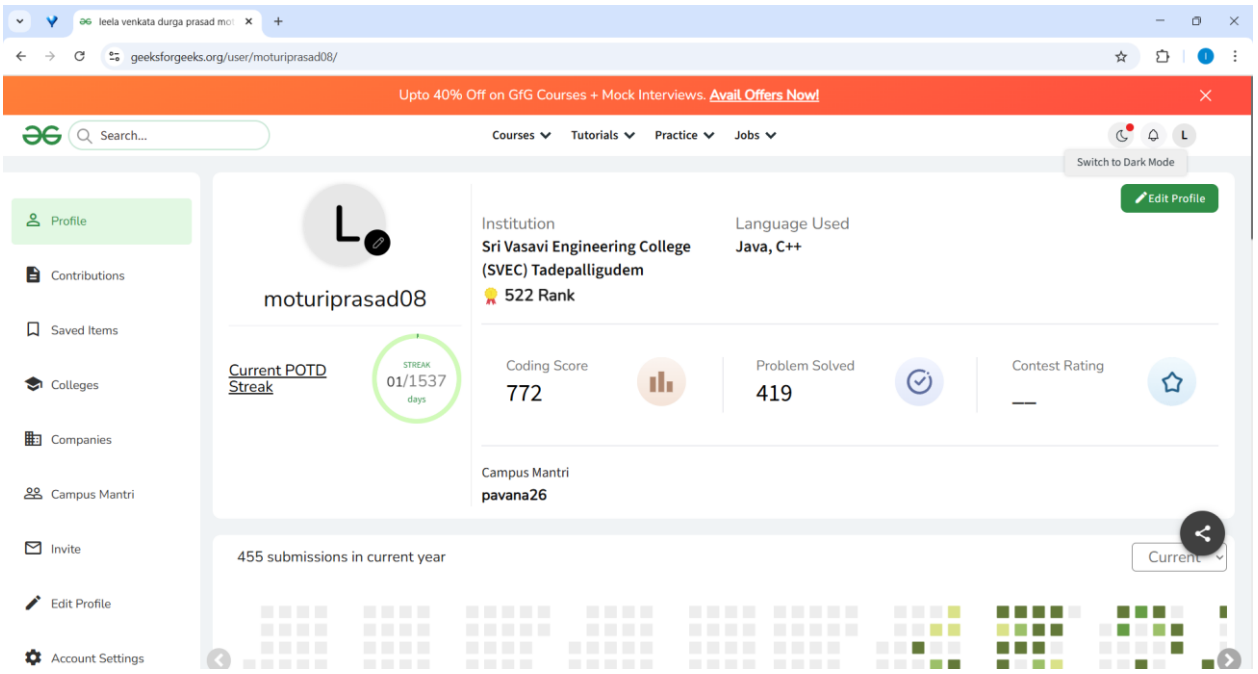
This is to certify that this is a bonafide record of Practical Work done in ***Master Coding in Competitive Programming-I Lab*** *by Mr / Ms* _____ *bearing Roll No.* _____ *of* _____ *Branch of V Semester during the academic year 2025-26.*

No. of Experiments Done:

Faculty Incharge of the Laboratory

Head of the Department

EXTERNAL EXAMINER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522 Rank
Language Used
Java, C++
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Coding Score
772
Problem Solved
419
Contest Rating
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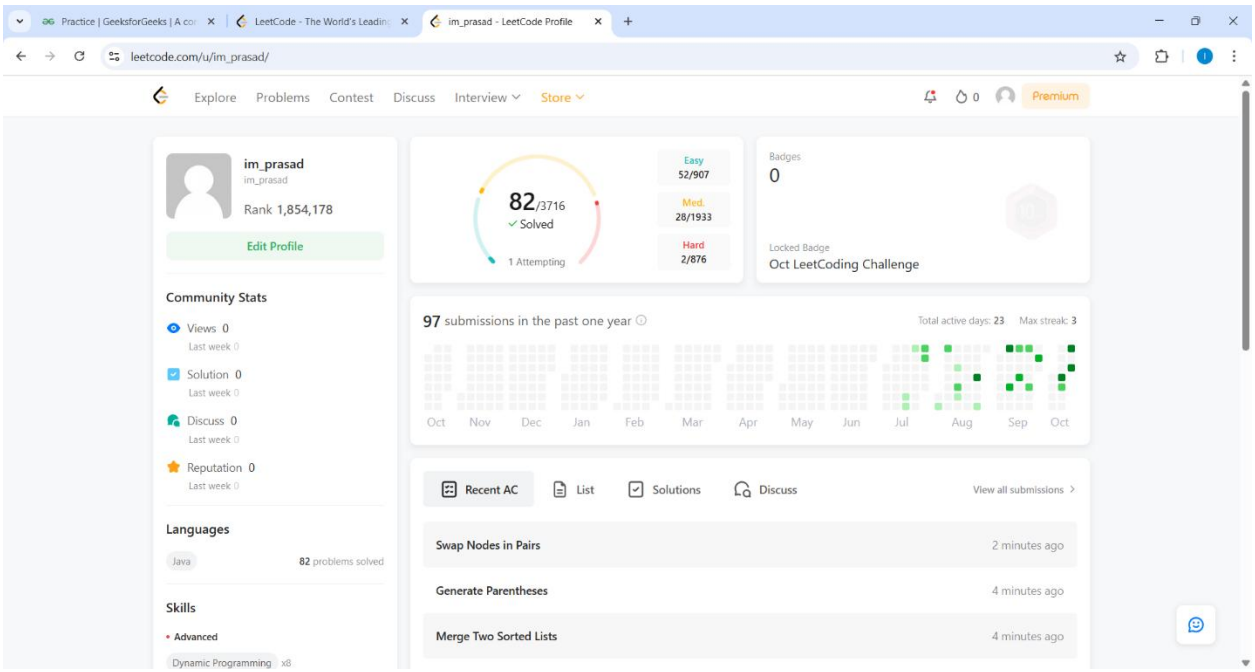
pavana26
455 submissions in current year
Current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Languages
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Hard
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Oct LeetCoding Challenge
97 submissions in the past one year
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Swap Nodes in Pairs
2 minutes ago
Generate Parentheses
4 minutes ago
Merge Two Sorted Lists
4 minutes ago

Programs on Matrices Problems			
47	Row-wise sorted matrices	61-62	
48	Transpose of the Matrix	63	
49	2D Dimensions	64	
50	Square Matrix	65	

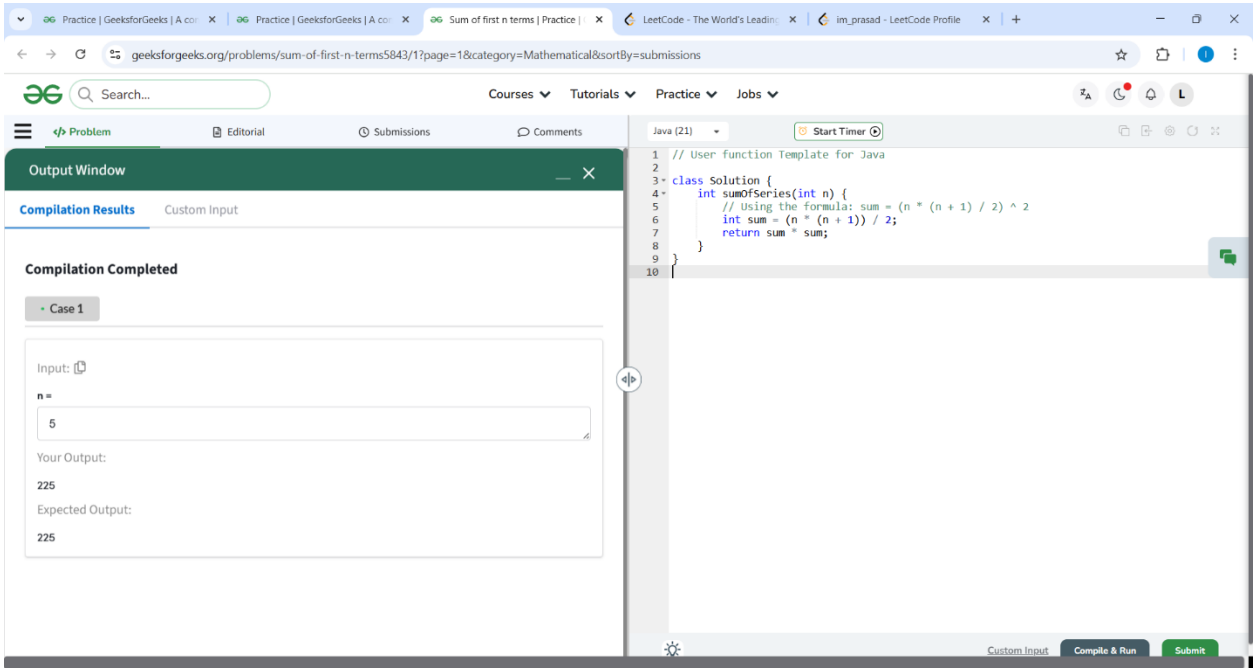
Mathematical Problems

1. Given an integer **n,** calculate the sum of series $1^3 + 2^3 + 3^3 + 4^3 + \ldots$ till n-th term.

```
// User function Template for Java

class Solution {
    int sumOfSeries(int n) {
        // Using the formula: sum = (n * (n + 1) / 2) ^ 2
        int sum = (n * (n + 1)) / 2;
        return sum * sum;
    }
}
```

OUTPUT:



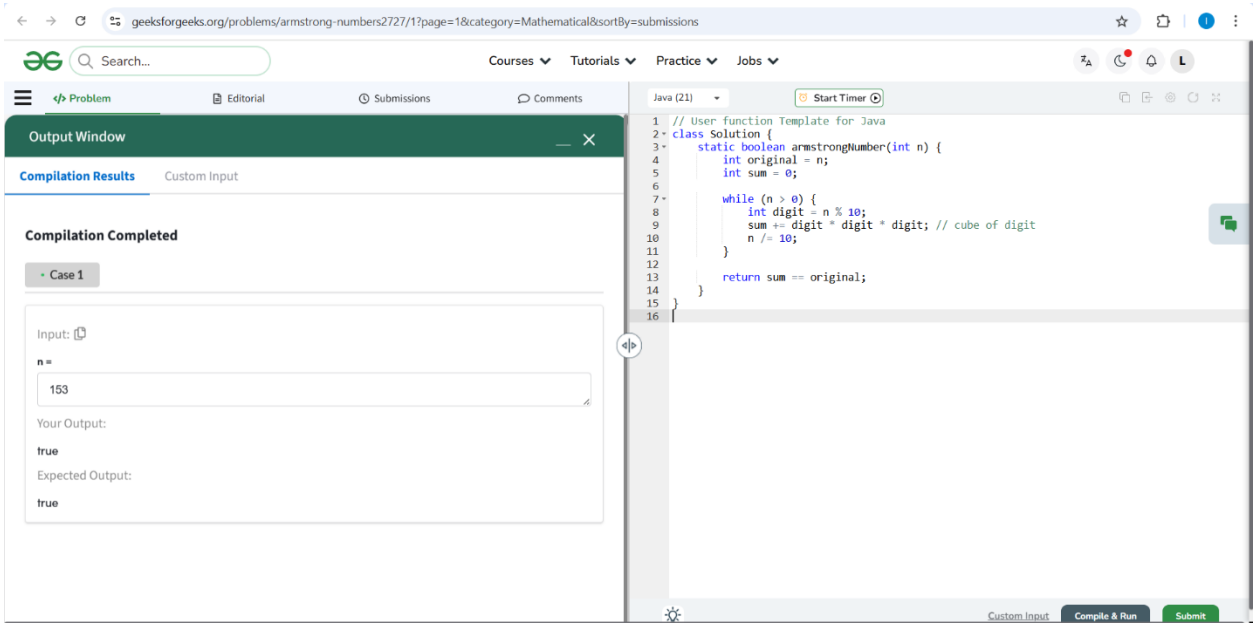
2. You are given a **3-digit** number **n**, Find whether it is an **Armstrong** number or not.

```
// User function Template for Java
class Solution {
    static boolean armstrongNumber(int n) {
        int original = n;
        int sum = 0;

        while (n > 0) {
            int digit = n % 10;
            sum += digit * digit * digit; // cube of digit
            n /= 10;
        }

        return sum == original;
    }
}
```

OUTPUT:



3. You are given an integer **n.** Your task is to reverse the digits, ensuring that the reversed number has no leading zeroes.

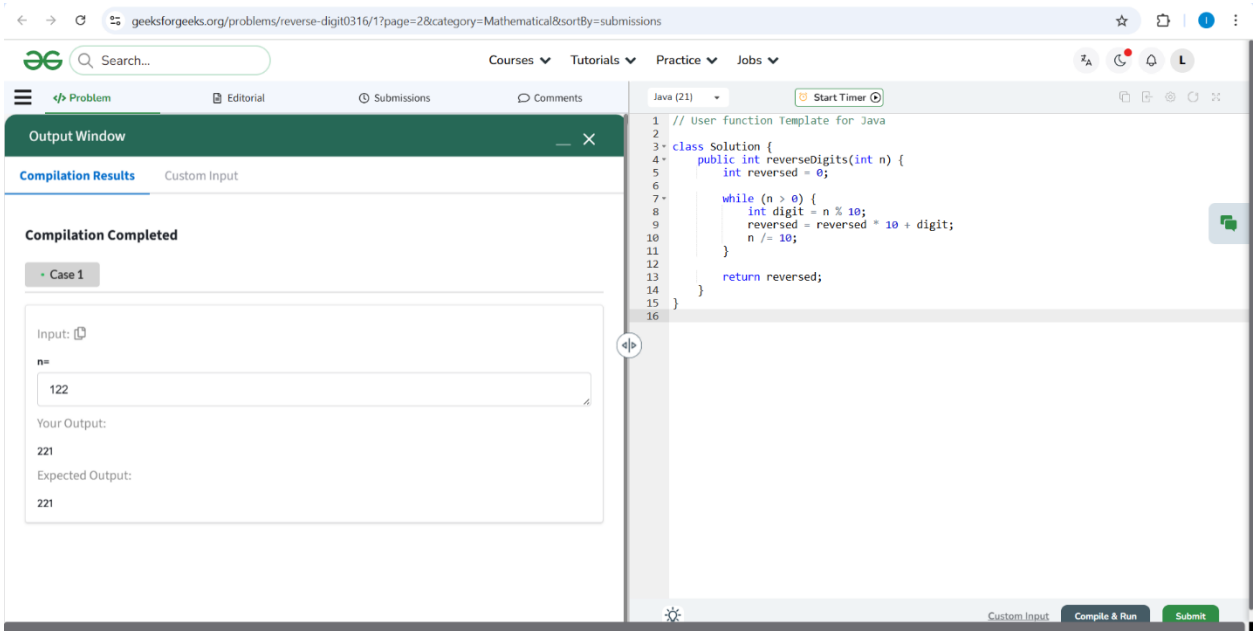
// User function Template for Java

```
class Solution {
    public int reverseDigits(int n) {
        int reversed = 0;

        while (n > 0) {
            int digit = n % 10;
            reversed = reversed * 10 + digit;
            n /= 10;
        }

        return reversed;
    }
}
```

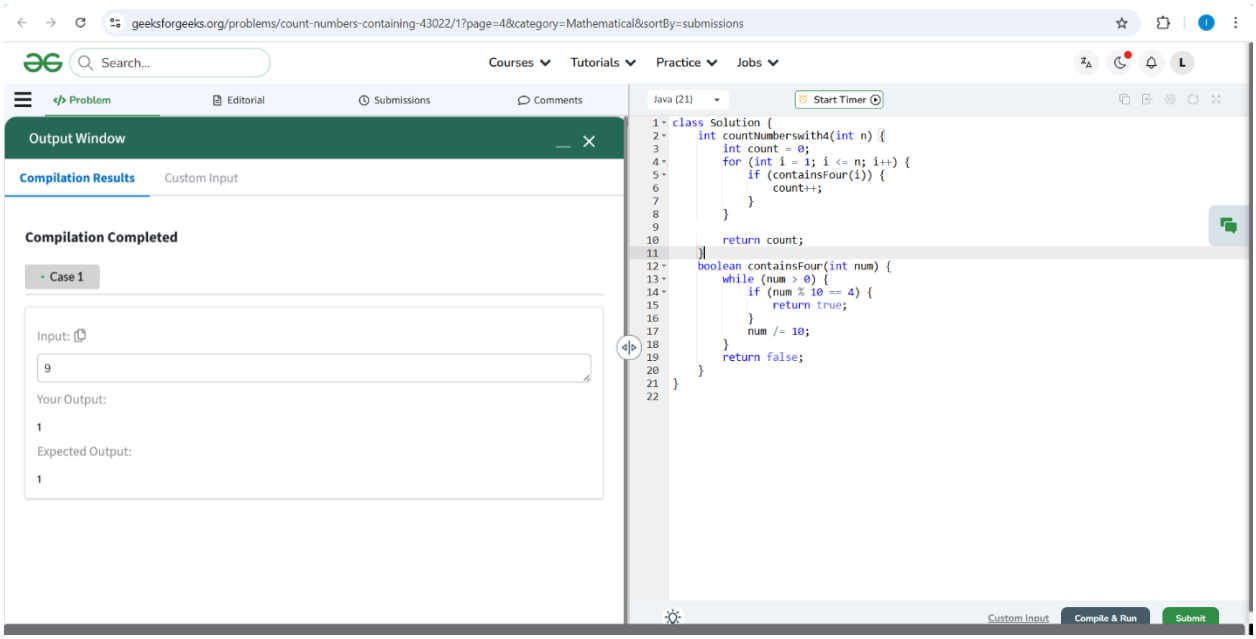
OUTPUT:



4.You are given a number **n**, Return the count of total numbers from **1** to **n** containing **4** as a digit.

```
class Solution {
    int countNumberswith4(int n) {
        int count = 0;
        for (int i = 1; i <= n; i++) {
            if (containsFour(i)) {
                count++;
            }
         return count;
    }
    boolean containsFour(int num) {
        while (num > 0) {
            if (num % 10 == 4) {
                return true;
            }
            num /= 10;
        }
        return false;
    }
}
```

OUTPUT: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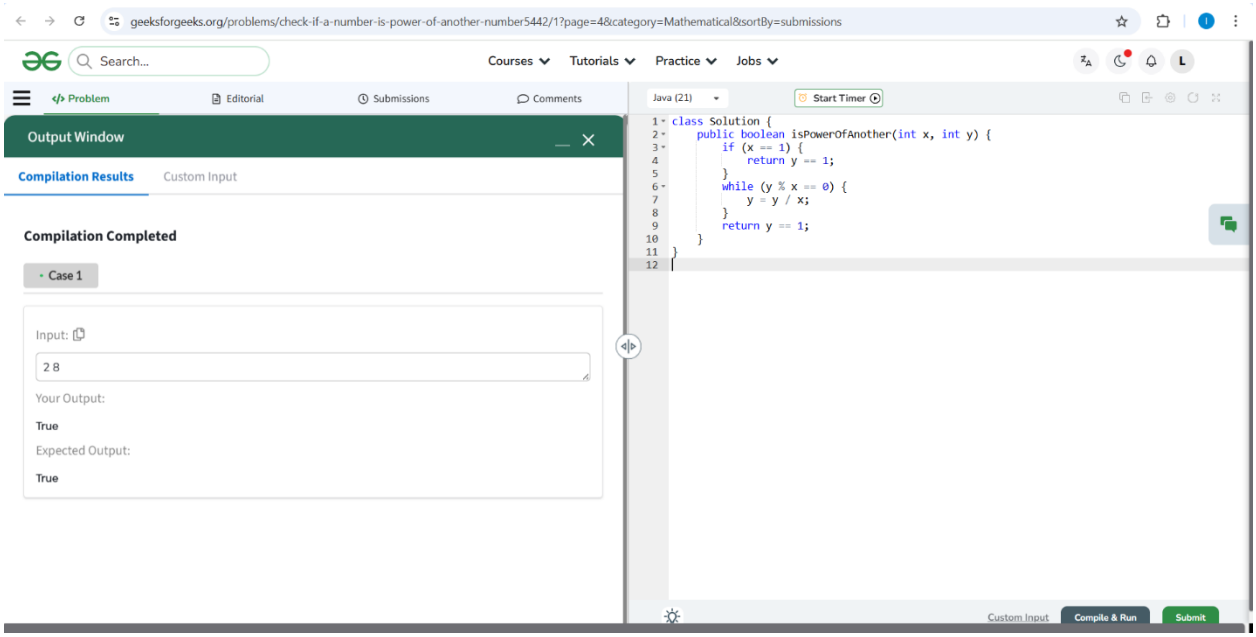
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
9
Your Output:
1
Expected Output:
1
Java (21)
Start Timer
class Solution {
int countNumberswith4(int n) {
int count = 0;
for (int i = 1; i <= n; i++) {
if (containsFour(i)) {
count++;
}
}
return count;
}
boolean containsFour(int num) {
while (num > 0) {
if (num % 10 == 4) {
return true;
}
num /= 10;
}
return false;
}
}
Custom Input
Compile & Run
Submit

5. Given two positive integers **x** and **y**, determine if y is a power of x. If y is a power of x, return **True**. Otherwise, return **False**.

```
class Solution {
  public boolean isPowerOfAnother(int x, int y) {
    if (x == 1) {
      return y == 1;
    }
    while (y % x == 0) {
      y = y / x;
    }
    return y == 1;
  }
}
```

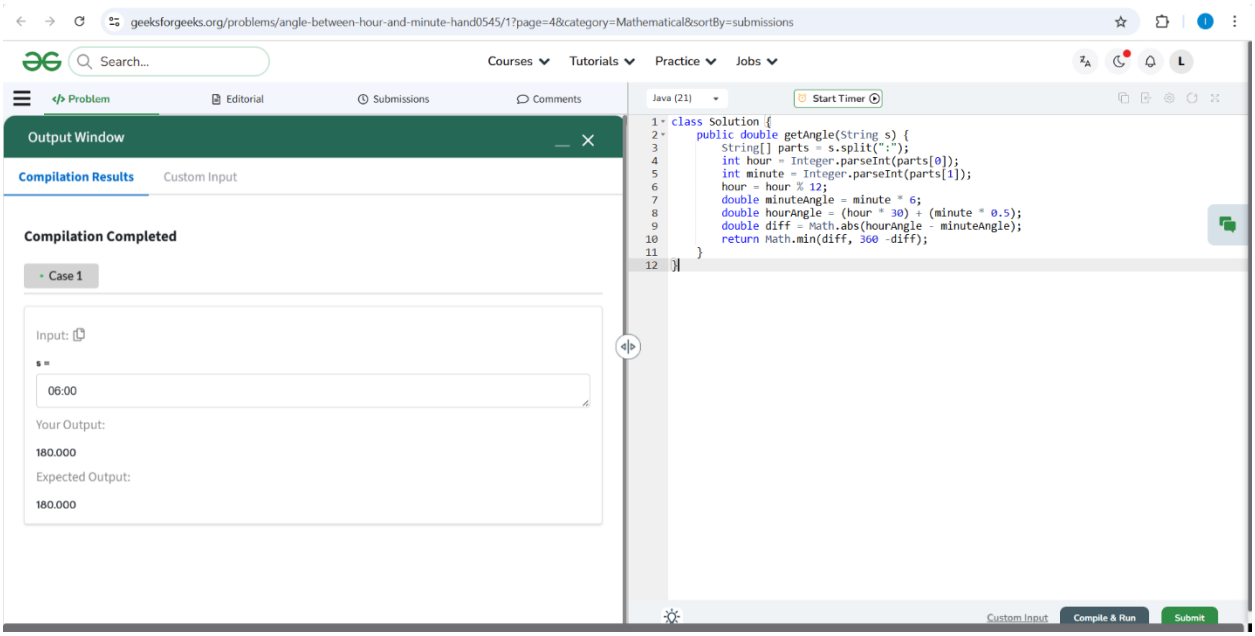
OUTPUT:



6. Given a string **s** representing time in 24-hour format **"HH:MM"**, compute the **smallest** angle in **degrees** between the hour and minute hands of an analog clock.

```
class Solution {
    public double getAngle(String s) {
        String[] parts = s.split(":");
        int hour = Integer.parseInt(parts[0]);
        int minute = Integer.parseInt(parts[1]);
        hour = hour % 12;
        double minuteAngle = minute * 6;
        double hourAngle = (hour * 30) + (minute * 0.5);
        double diff = Math.abs(hourAngle - minuteAngle);
        return Math.min(diff, 360 -diff);
    }
}
```

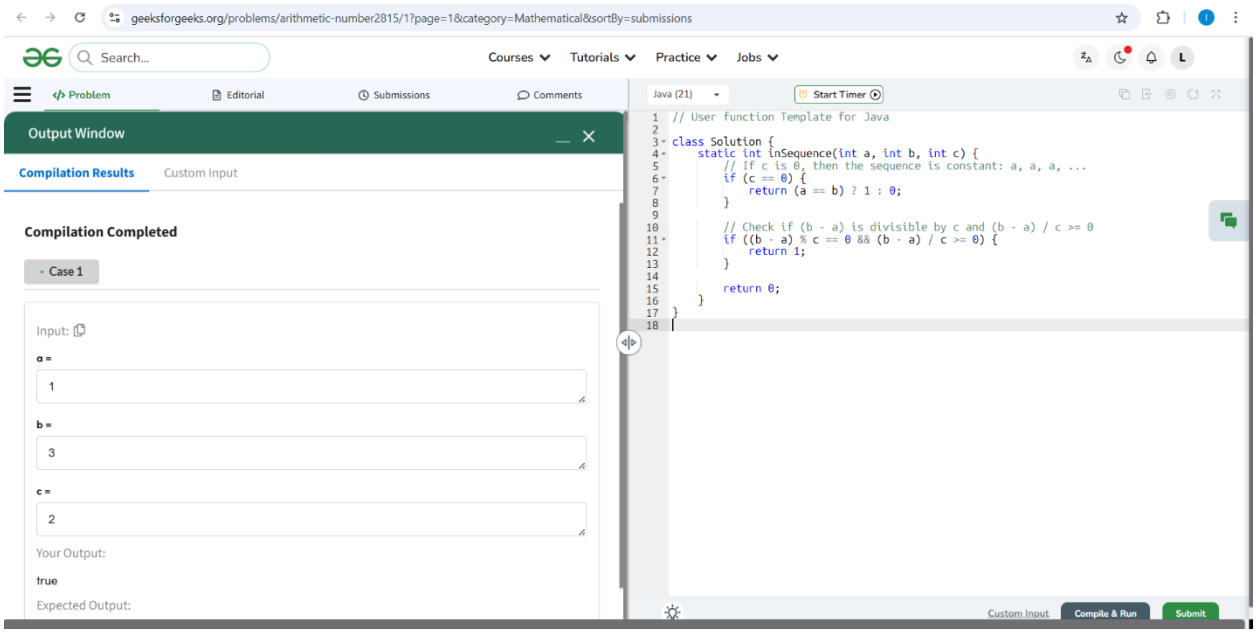
OUTPUT:



7. Given three integers **'a'** denotes the first term of an arithmetic sequence, **'c'** denotes the common difference of an arithmetic sequence and an integer **'b'**. you need to tell whether 'b' exists in the arithmetic sequence or not. Return 1 if b is present in the sequence. Otherwise, returns 0.

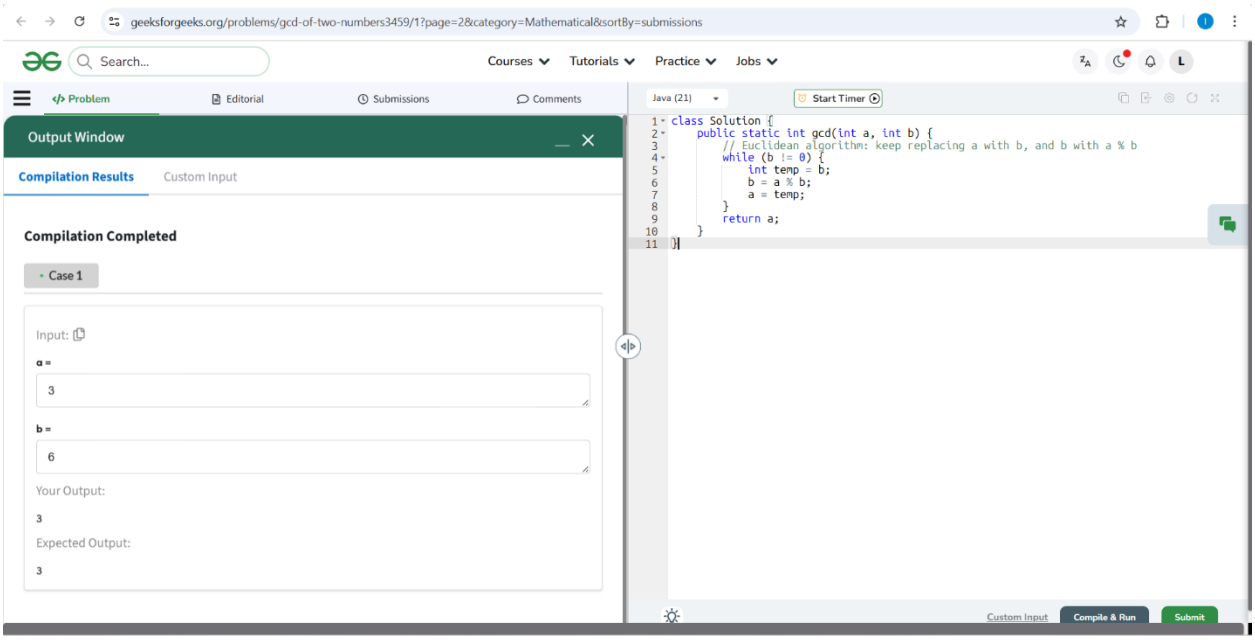
```
// User function Template for Java

class Solution {
    static int inSequence(int a, int b, int c) {
        // If c is 0, then the sequence is constant: a, a, a, ...
        if (c == 0) {
            return (a == b) ? 1 : 0;
        }

        // Check if (b - a) is divisible by c and (b - a) / c >= 0
        if ((b - a) % c == 0 && (b - a) / c >= 0) {
            return 1;
        }

        return 0;
    }
}
```

OUTPUT:



8. Given two positive integers **a** and **b**, find GCD of a and b.

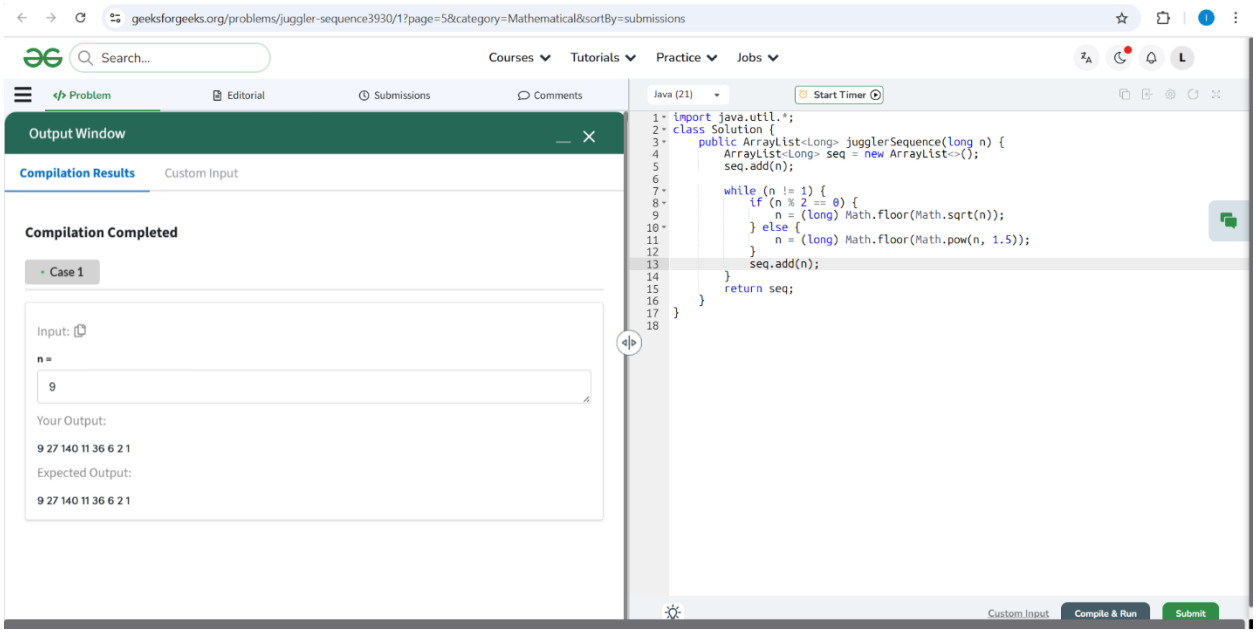
```
class Solution {
    public static int gcd(int a, int b) {
        // Euclidean algorithm: keep replacing a with b, and b with a % b
        while (b != 0) {
            int temp = b;
            b = a % b;
            a = temp;
        }
        return a;
    }
    }OUTPUT:
```



9. Juggler Sequence is a series of integers in which the first term starts with a positive integer number *a* and the remaining terms are generated from the immediate previous term using the below recurrence relation:

```
import java.util.*;
class Solution {
    public ArrayList<Long> jugglerSequence(long n) {
        ArrayList<Long> seq = new ArrayList<>();
        seq.add(n);

        while (n != 1) {
            if (n % 2 == 0) {
                n = (long) Math.floor(Math.sqrt(n));
            } else {
                n = (long) Math.floor(Math.pow(n, 1.5));
            }
            seq.add(n);
        }
        return seq;
    }
}
```

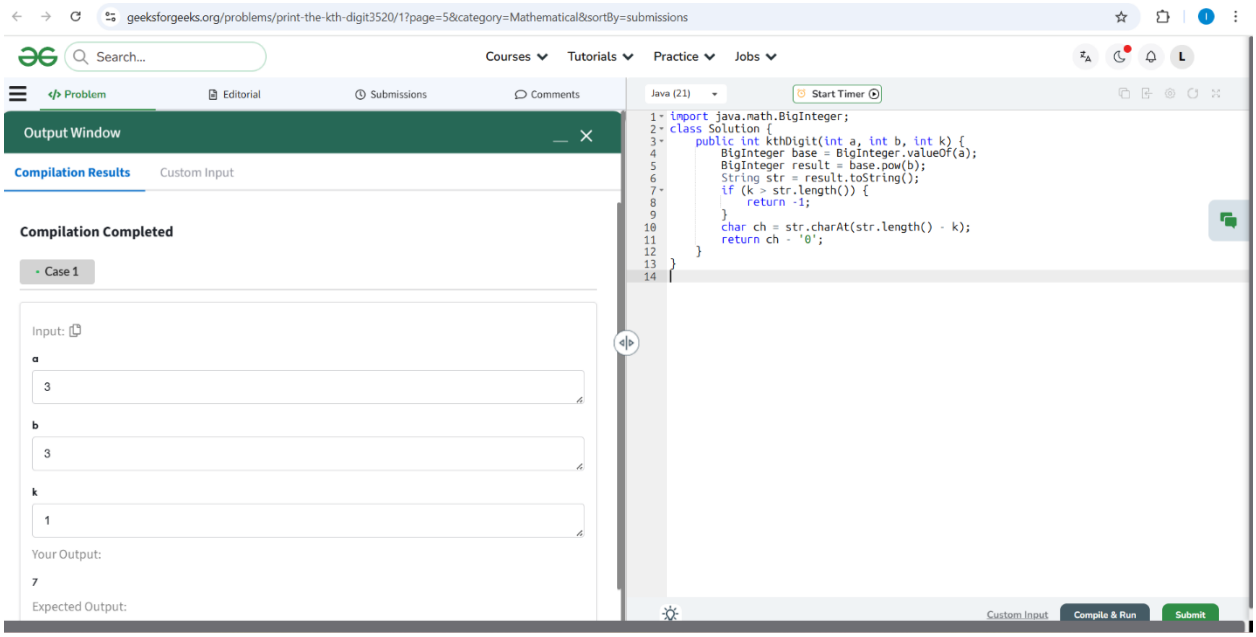
OUTPUT:



10. Given two numbers **a** and **b**, find **kth** digit from right of **a^{b}.**

```
import java.math.BigInteger;
class Solution {
   public int kthDigit(int a, int b, int k) {
      BigInteger base = BigInteger.valueOf(a);
      BigInteger result = base.pow(b);
      String str = result.toString();
      if (k > str.length()) {
         return -1;
      }
      char ch = str.charAt(str.length() - k);
      return ch - '0';
   }
}
```

OUTPUT:

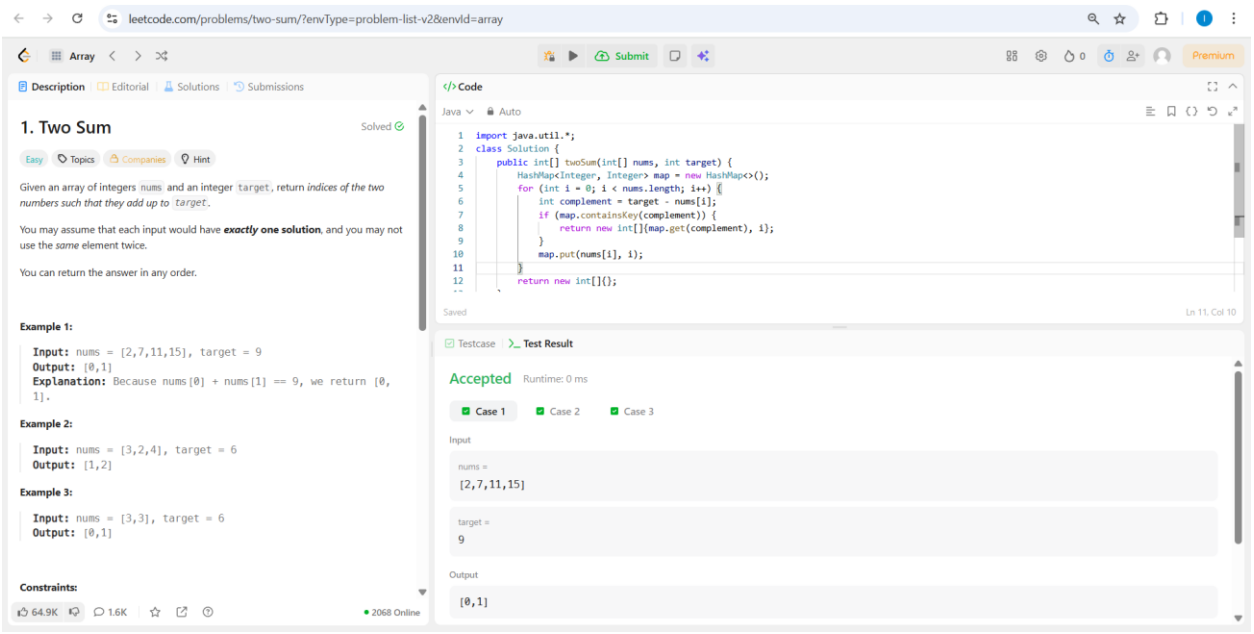


Programs on Array problems

11. Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.

```
import java.util.*;
class Solution {
    public int[] twoSum(int[] nums, int target) {
        HashMap<Integer, Integer> map = new HashMap<>();
        for (int i = 0; i < nums.length; i++) {
            int complement = target - nums[i];
            if (map.containsKey(complement)) {
                return new int[]{map.get(complement), i};
            }
            map.put(nums[i], i);
        }
        return new int[]{};
    }
}
```

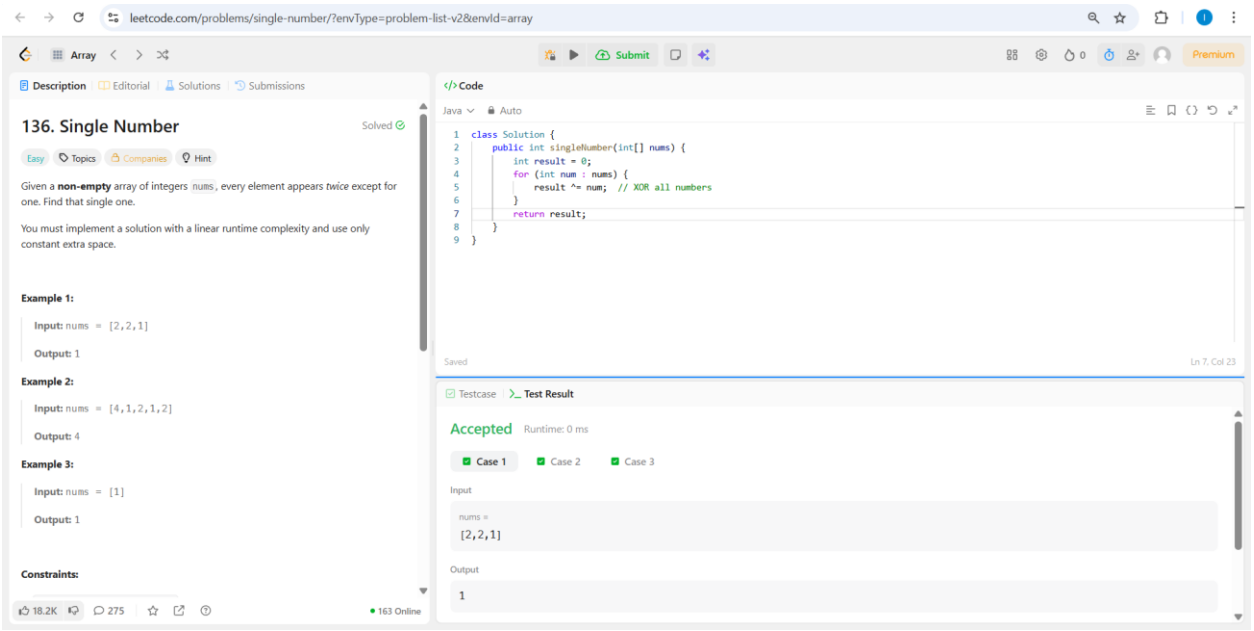
OUTPUT:



12. Given a **non-empty** array of integers nums, every element appears *twice* except for one. Find that single one.
You must implement a solution with a linear runtime complexity and use only constant extra space.

```
class Solution {
    public int singleNumber(int[] nums) {
        int result = 0;
        for (int num : nums) {
            result ^= num;  // XOR all numbers
        }
        return result;
    }
}
```

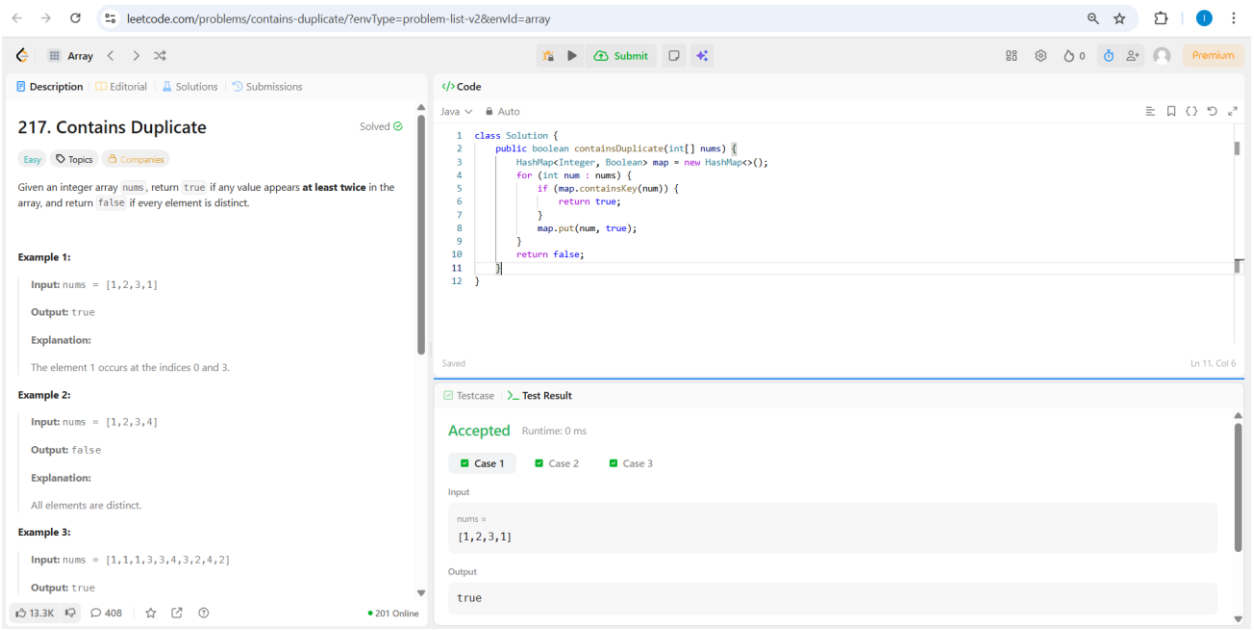
OUTPUT:



13. Given an integer array nums, return true if any value appears **at least twice** in the array, and return false if every element is distinct.

```
class Solution {
    public boolean containsDuplicate(int[] nums) {
        HashMap<Integer, Boolean> map = new HashMap<>();
        for (int num : nums) {
            if (map.containsKey(num)) {
                return true;
            }
            map.put(num, true);
        }
        return false;
    }
}
```

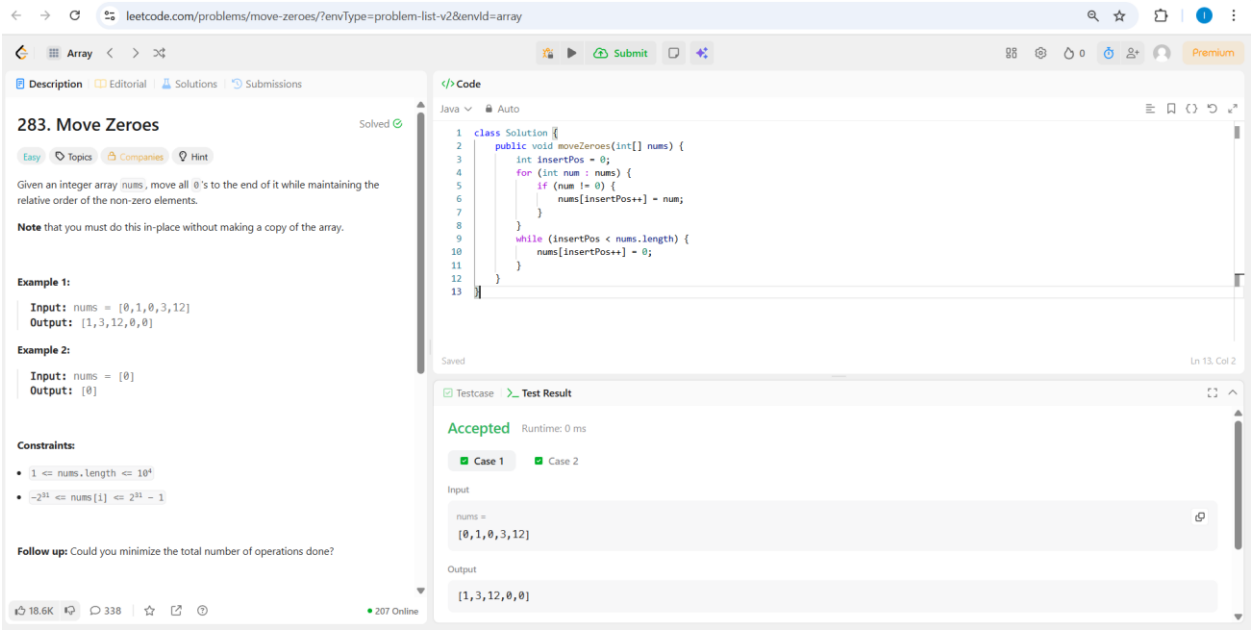
OUTPUT:



14. Given an integer array nums, move all 0's to the end of it while maintaining the relative order of the non-zero elements.

```
class Solution {
    public void moveZeroes(int[] nums) {
        int insertPos = 0;
        for (int num : nums) {
            if (num != 0) {
                nums[insertPos++] = num;
            }
        }
        while (insertPos < nums.length) {
            nums[insertPos++] = 0;
        }
    }
}
```

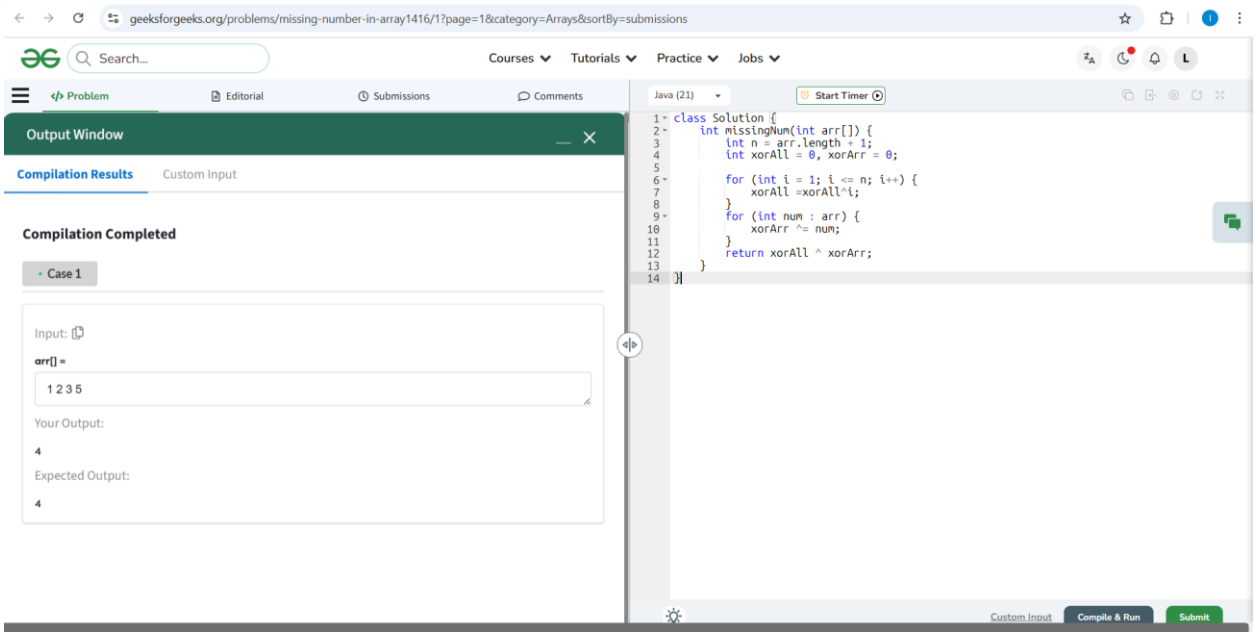
OUTPUT :



15. You are given an array **arr[]** of size **n - 1** that contains **distinct integers** in the range from 1 to n (inclusive). This array represents a permutation of the integers from 1 to n with **one element missing**. Your task is to identify and return the **missing element**.

```
class Solution {
    int missingNum(int arr[]) {
        int n = arr.length + 1;
        int xorAll = 0, xorArr = 0;

        for (int i = 1; i <= n; i++) {
            xorAll =xorAll^i;
        }
        for (int num : arr) {
            xorArr ^= num;
        }
        return xorAll ^ xorArr;
    }
}
```

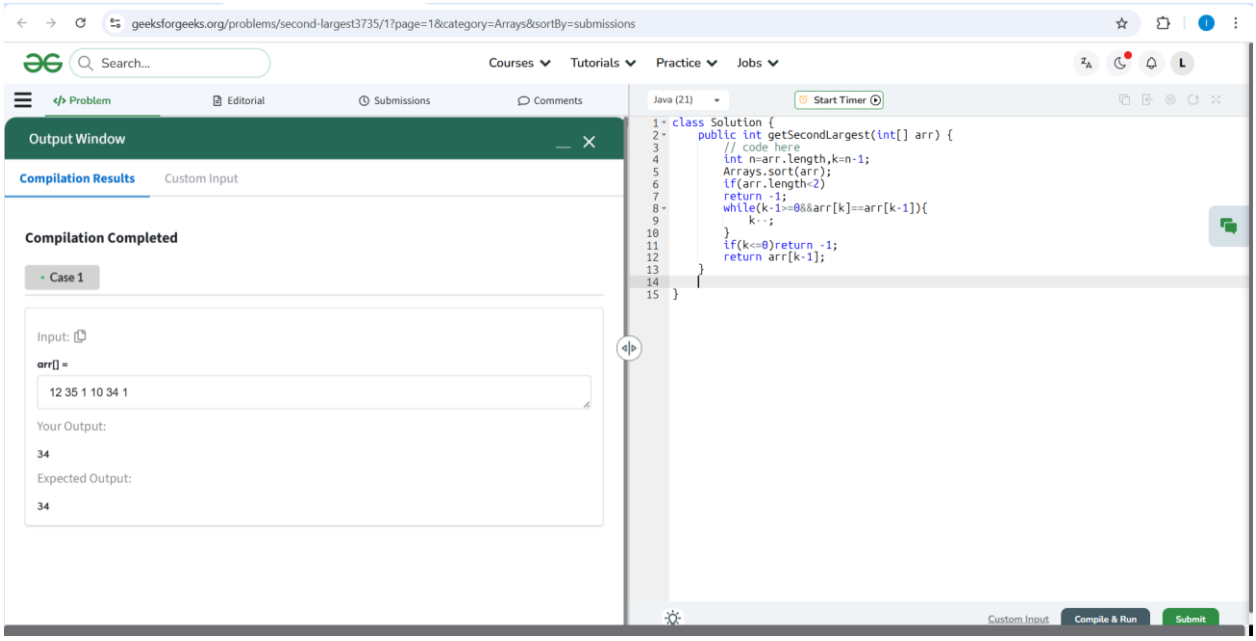
OUTPUT:



16. Given an array of **positive** integers **arr[]**, return the **second largest** element from the array. If the second largest element doesn't exist then return **-1.**

```
class Solution {
    public int getSecondLargest(int[] arr) {
        // code here
        int n=arr.length,k=n-1;
        Arrays.sort(arr);
        if(arr.length<2)
        return -1;
        while(k-1>=0&&arr[k]==arr[k-1]){
            k--;
        }
        if(k<=0)return -1;
        return arr[k-1];
    }
}
```

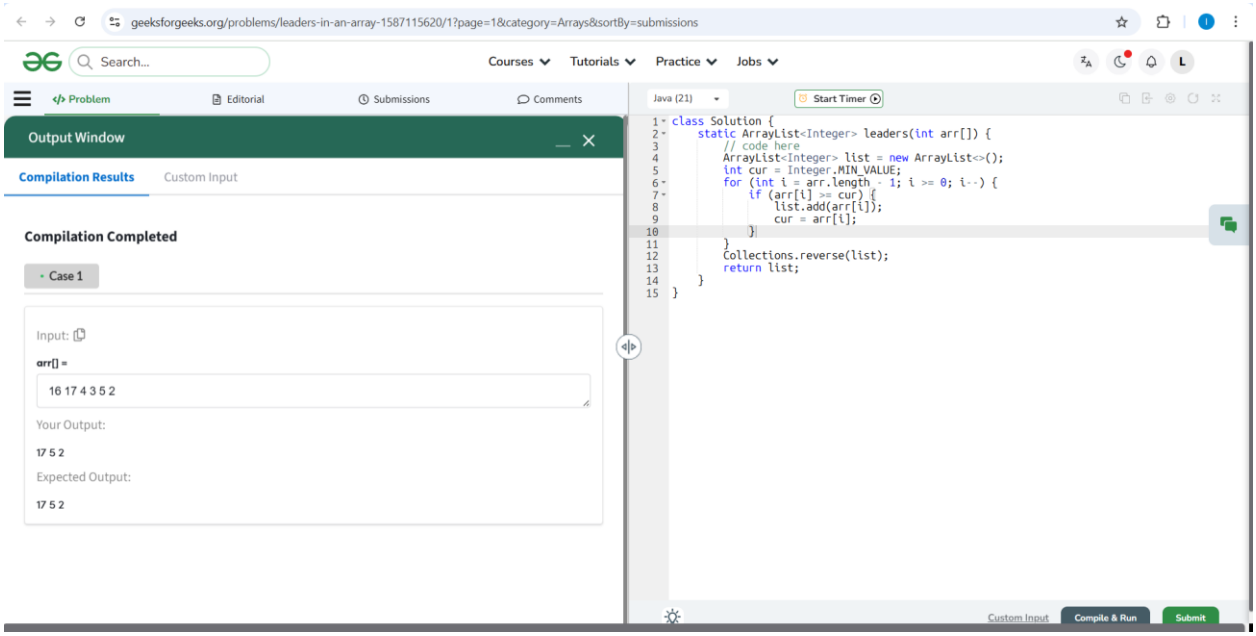
OUTPUT :



17. You are given an array **arr** of positive integers. Your task is to find all the leaders in the array. An element is considered a leader if it is greater than or equal to all elements to its right. The rightmost element is always a leader.

```
class Solution {
    static ArrayList<Integer> leaders(int arr[]) {
        // code here
        ArrayList<Integer> list = new ArrayList<>();
        int cur = Integer.MIN_VALUE;
        for (int i = arr.length - 1; i >= 0; i--) {
            if (arr[i] >= cur) {
                list.add(arr[i]);
                cur = arr[i];
            }
        }
        Collections.reverse(list);
        return list;
    }
}
```

OUTPUT:

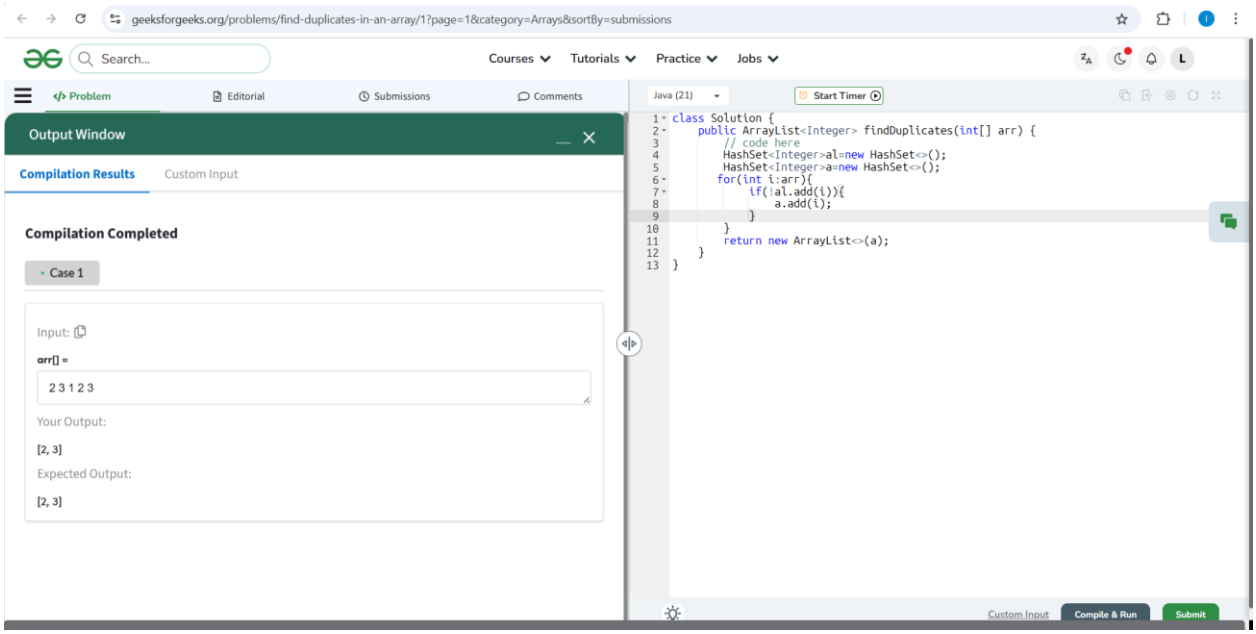


18. Given an array **arr[]** of size **n**, containing elements from the range **1** to **n**, and each element appears at most **twice**, return an array of all the integers that appears twice.

You can return the elements in any order but the driver code will print them in sorted order.

```
class Solution {
    public ArrayList<Integer> findDuplicates(int[] arr) {
        // code here
        HashSet<Integer>al=new HashSet<>();
        HashSet<Integer>a=new HashSet<>();
       for(int i:arr){
            if(!al.add(i)){
                a.add(i);
            }
        }
        return new ArrayList<>(a);
    }
}
```

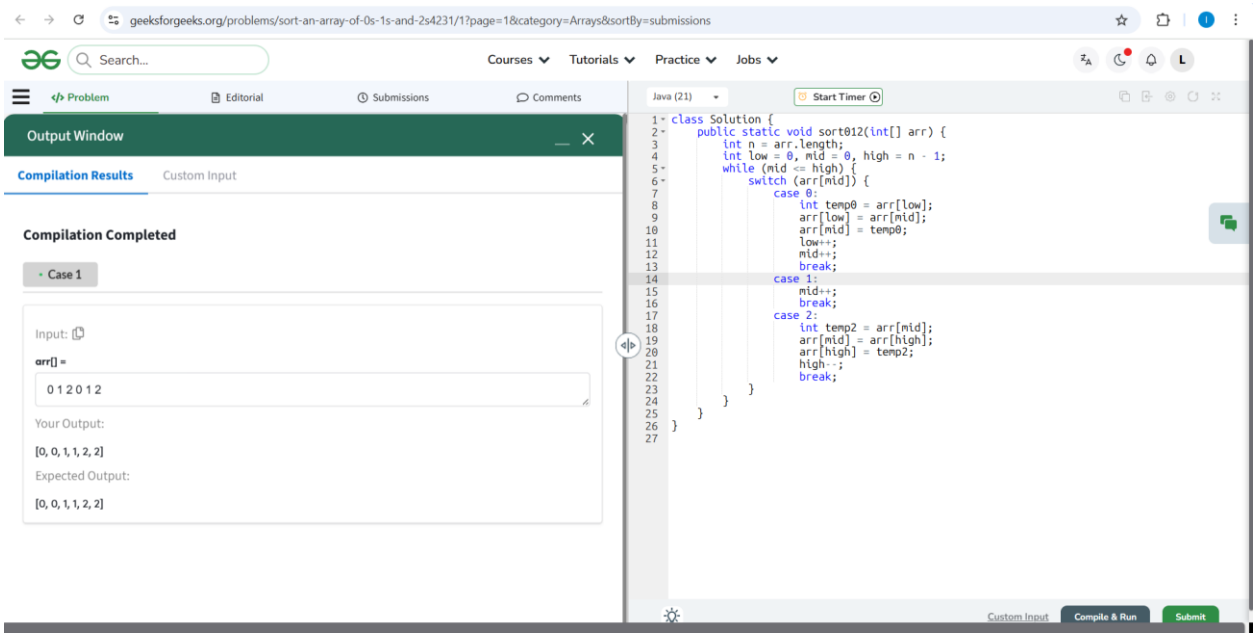
OUTPUT :



19. Given an array **arr[]** containing only **0s, 1s, and 2s.** Sort the array in ascending order.
Note: You need to solve this problem without utilizing the built-in sort function.

```
class Solution {
    public static void sort012(int[] arr) {
        int n = arr.length;
        int low = 0, mid = 0, high = n - 1;
        while (mid <= high) {
            switch (arr[mid]) {
                case 0:
                    int temp0 = arr[low];
                    arr[low] = arr[mid];
                    arr[mid] = temp0;
                    low++;
                    mid++;
                    break;
                case 1:
                    mid++;
                    break;
                case 2:
                    int temp2 = arr[mid];
                    arr[mid] = arr[high];
                    arr[high] = temp2;
                    high--;
                    break;
            }
        }
    }
}
```

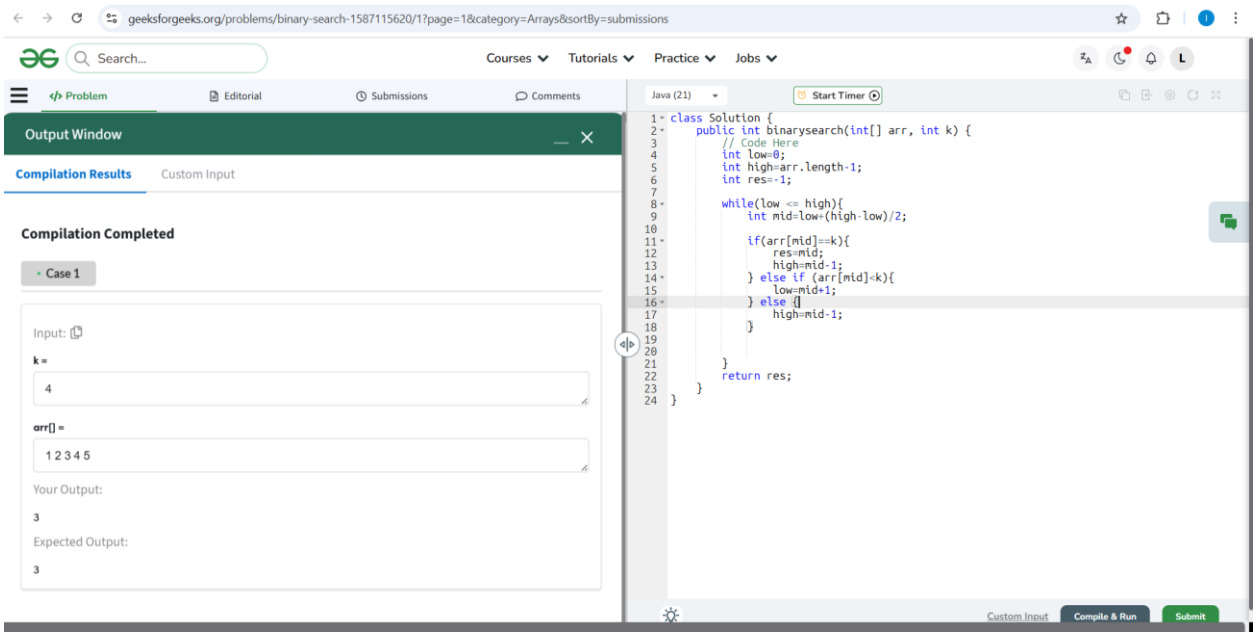
OUTPUT:



20. Given a sorted array **arr[]** and an integer **k**, find the position(0-based indexing) at which k is present in the array using binary search. If k doesn't exist in arr[] return **-1**.
Note: If multiple occurrences are there, please return the smallest index.

```
class Solution {
    public int binarysearch(int[] arr, int k) {
        // Code Here
        int low=0;
        int high=arr.length-1;
        int res=-1;

        while(low <= high){
            int mid=low+(high-low)/2;

            if(arr[mid]==k){
                res=mid;
                high=mid-1;
            } else if (arr[mid]<k){
                low=mid+1;
            } else {
                high=mid-1;
            }


        }
        return res;
    }
}
```

OUTPUT:

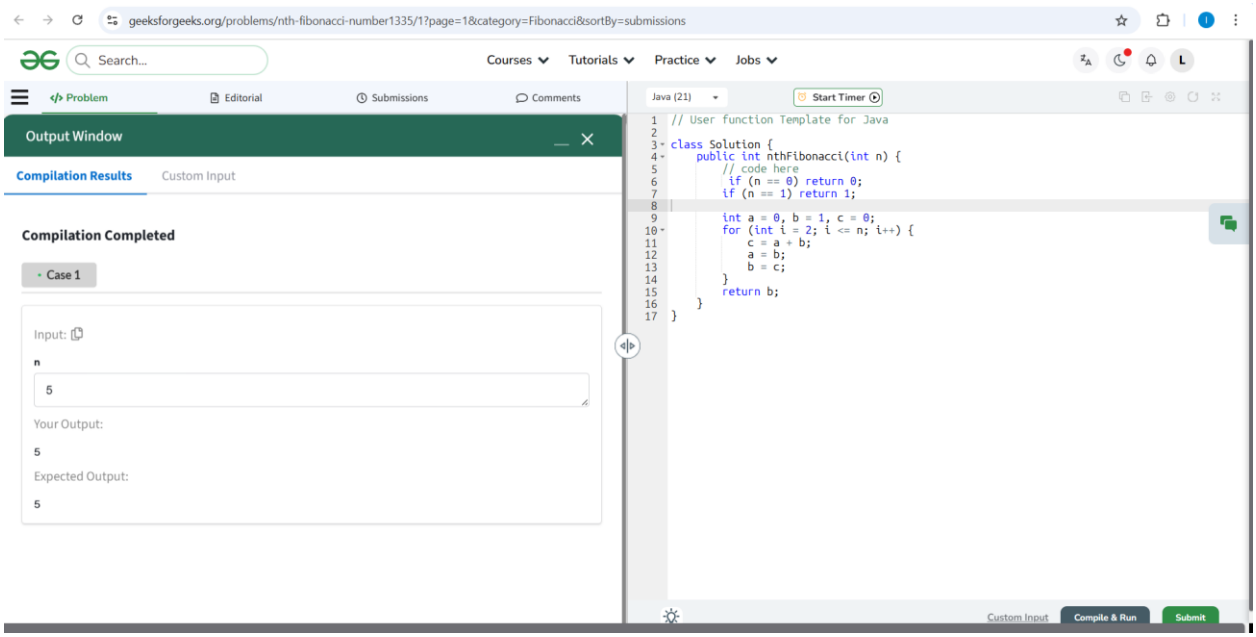


Programs on Fibonacci Problems

21. Given a non-negative integer **n**, your task is to find the **nth Fibonacci number**.
The Fibonacci sequence is a sequence where the next term is the sum of the previous two terms. The first two terms of the Fibonacci sequence are 0 followed by 1. The Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21

```
// User function Template for Java

class Solution {
   public int nthFibonacci(int n) {
       // code here
        if (n == 0) return 0;
       if (n == 1) return 1;

       int a = 0, b = 1, c = 0;
       for (int i = 2; i <= n; i++) {
          c = a + b;
          a = b;
          b = c;
       }
       return b;
   }
}
```

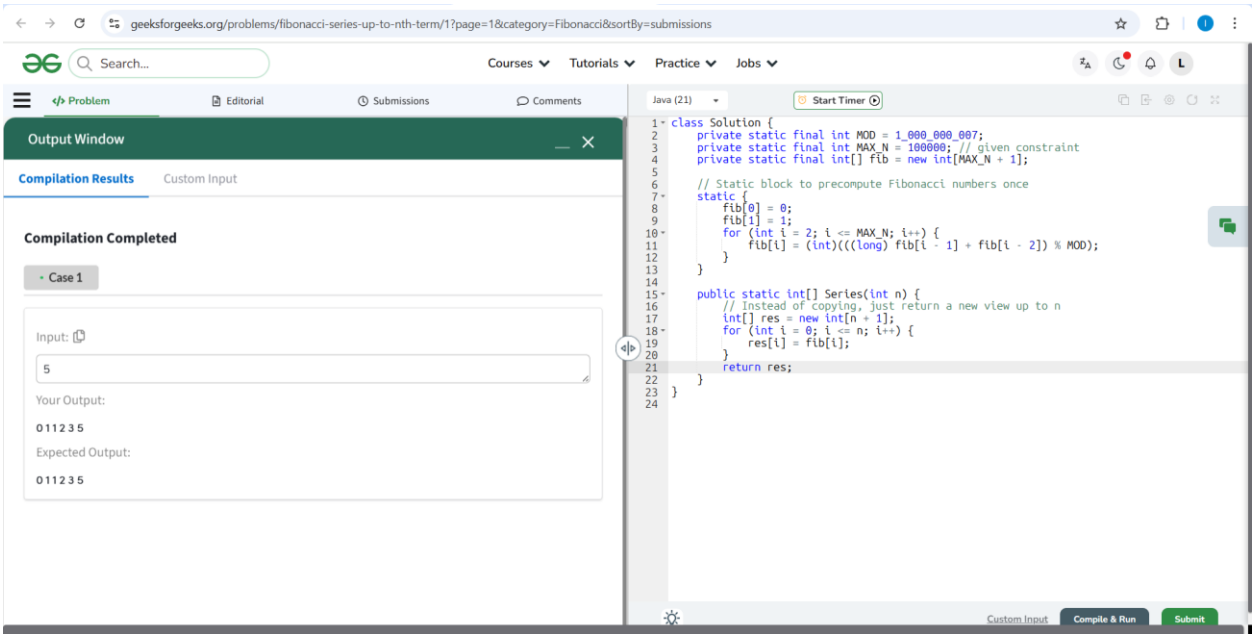
OUTPUT :



22. You are given an integer **n**, return the fibonacci series till the **nth**(0-based indexing) term. Since the terms can become very large return the terms **modulo 10^9+7**.

```
class Solution {
    private static final int MOD = 1_000_000_007;
    private static final int MAX_N = 100000; // given constraint
    private static final int[] fib = new int[MAX_N + 1];
    // Static block to precompute Fibonacci numbers once
    static {
        fib[0] = 0;
        fib[1] = 1;
        for (int i = 2; i <= MAX_N; i++) {
            fib[i] = (int)(((long) fib[i - 1] + fib[i - 2]) % MOD);
        }
    }
    public static int[] Series(int n) {
        // Instead of copying, just return a new view up to n
        int[] res = new int[n + 1];
        for (int i = 0; i <= n; i++) {
            res[i] = fib[i];
        }
        return res;
    }
}
```

OUTPUT:


geeksforgeeks.org/problems/fibonacci-series-up-to-nth-term/1?page=1&category=Fibonacci&sortBy=submissions
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Submissions
Comments
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
5
Your Output:
0 1 1 2 3 5
Expected Output:
0 1 1 2 3 5
Java (21)
Start Timer
class Solution {
private static final int MOD = 1_000_000_007;
private static final int MAX_N = 100000; // given constraint
private static final int[] fib = new int[MAX_N + 1];
// Static block to precompute Fibonacci numbers once
static {
fib[0] = 0;
fib[1] = 1;
for (int i = 2; i <= MAX_N; i++) {
fib[i] = (int)(((long) fib[i - 1] + fib[i - 2]) % MOD);
}
}
public static int[] Series(int n) {
// Instead of copying, just return a new view up to n
int[] res = new int[n + 1];
for (int i = 0; i <= n; i++) {
res[i] = fib[i];
}
return res;
}
}
Custom Input
Compile & Run
Submit

23. Check if a given number N is the Fibonacci number. A Fibonacci number is a number that occurs in the Fibonacci series.

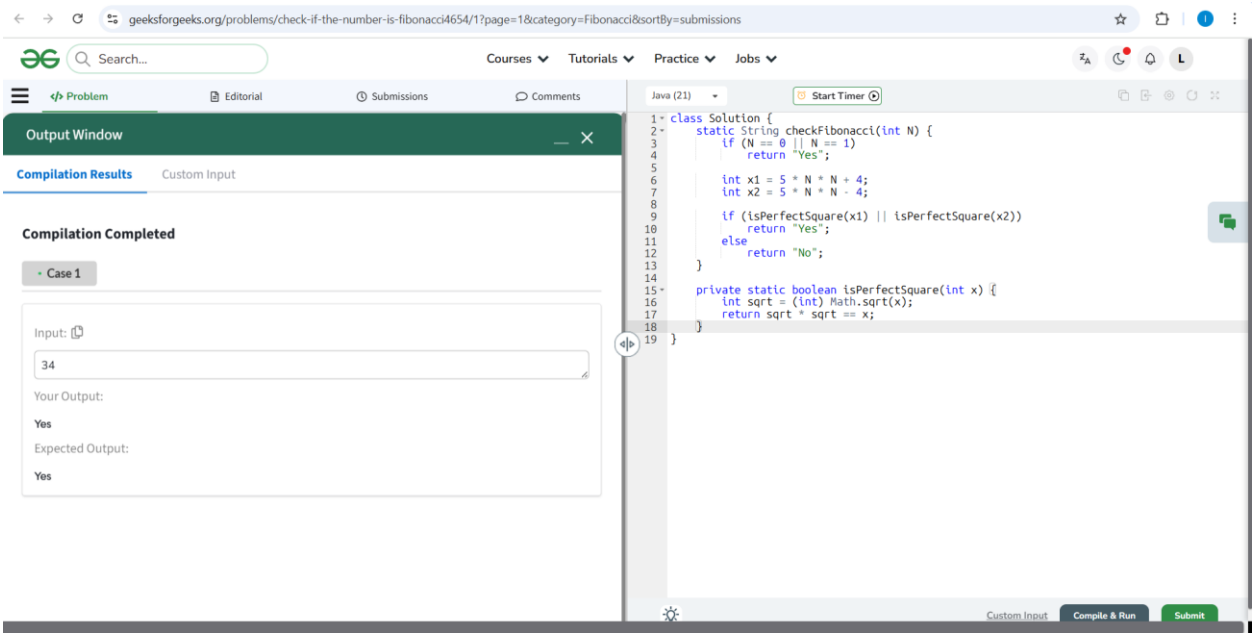
```
class Solution {
    static String checkFibonacci(int N) {
        if (N == 0 || N == 1)
            return "Yes";

        int x1 = 5 * N * N + 4;
        int x2 = 5 * N * N - 4;

        if (isPerfectSquare(x1) || isPerfectSquare(x2))
            return "Yes";
        else
            return "No";
    }

    private static boolean isPerfectSquare(int x) {
        int sqrt = (int) Math.sqrt(x);
        return sqrt * sqrt == x;
    }
}
```

OUTPUT:



24. The **Fibonacci numbers**, commonly denoted F(n) form a sequence, called the **Fibonacci sequence**, such that each number is the sum of the two preceding ones, starting from 0 and 1. That is,

F(0) = 0, F(1) = 1

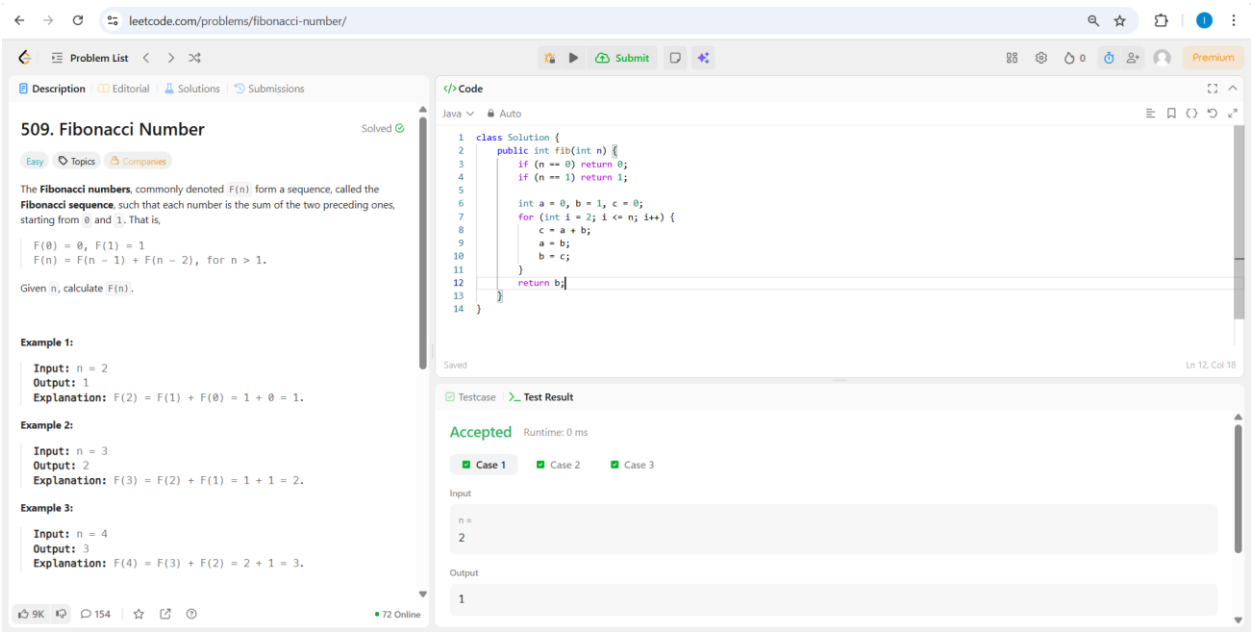
F(n) = F(n - 1) + F(n - 2), for n > 1.

Given n, calculate F(n).

```
class Solution {
    public int fib(int n) {
        if (n == 0) return 0;
        if (n == 1) return 1;

        int a = 0, b = 1, c = 0;
        for (int i = 2; i <= n; i++) {
            c = a + b;
            a = b;
            b = c;
        }
        return b;
    }
}
```

OUTPUT:

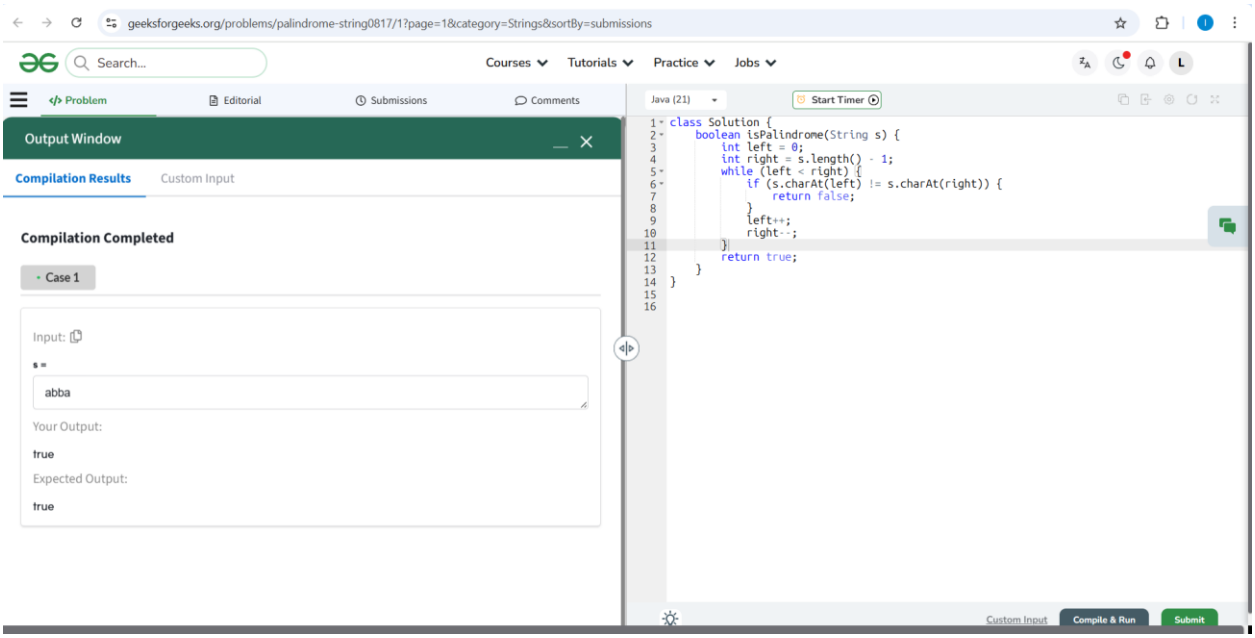


Programs on String Problems

25. You are given a string **s**. Your task is to determine if the string is a **palindrome**. A string is considered a palindrome if it reads the same forwards and backwards.

```
class Solution {
    boolean isPalindrome(String s) {
        int left = 0;
        int right = s.length() - 1;
        while (left < right) {
            if (s.charAt(left) != s.charAt(right)) {
                return false;
            }
            left++;
            right--;
        }
        return true;
    }
}
```

OUTPUT:

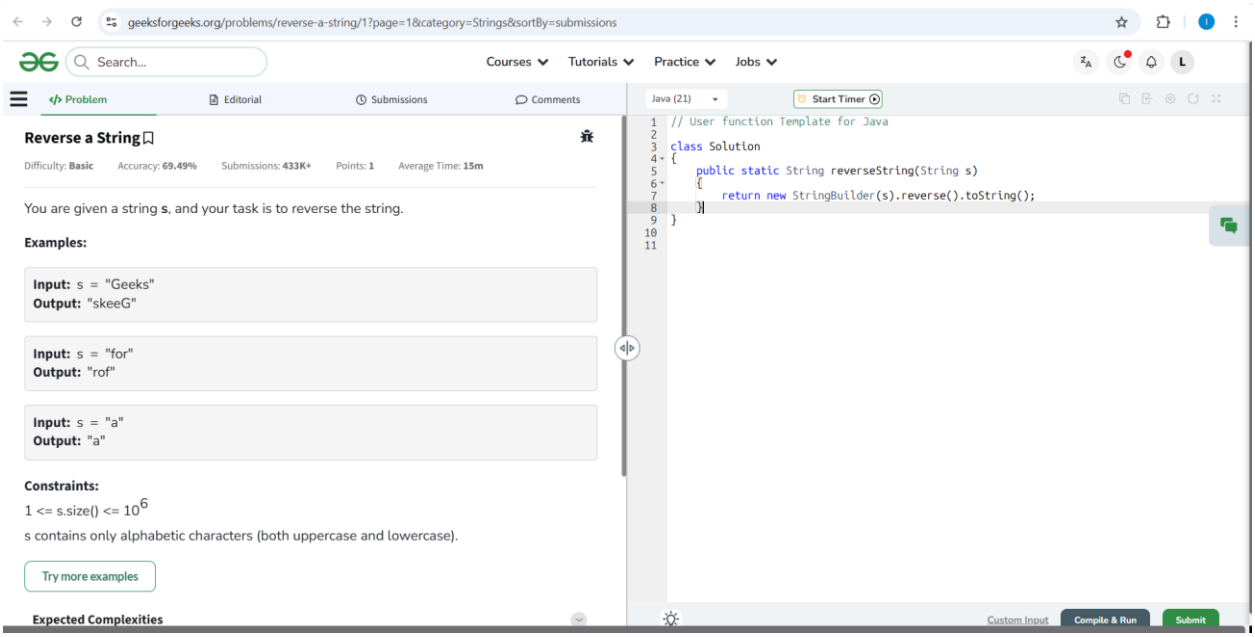


26. You are given a string **s**, and your task is to reverse the string.

```
// User function Template for Java

class Solution
{
   public static String reverseString(String s)
   {
      return new StringBuilder(s).reverse().toString();
   }
}
```

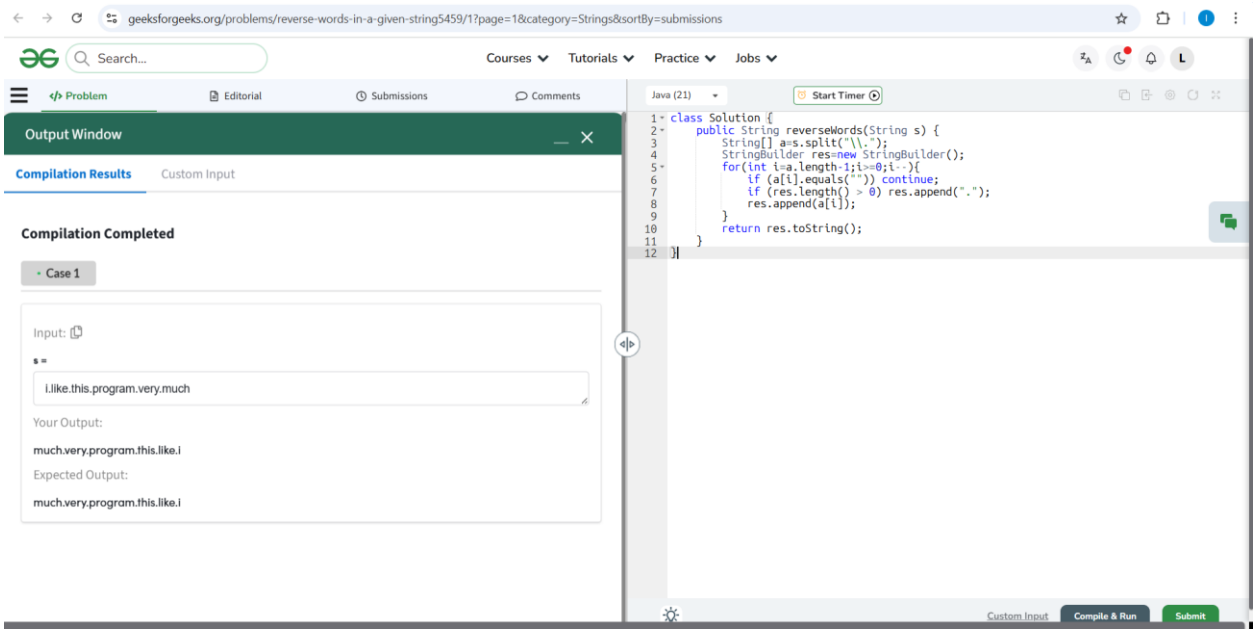
OUTPUT:



27. Given a string **s**, **reverse** the string without reversing its **individual words**. Words are separated by **dots(.)**.
Note: The string may contain leading or trailing dots(.) or multiple dots(.) between two words. The returned string should only have a single dot(.) separating the words, and **no extra dots** should be included.

```
class Solution {
    public String reverseWords(String s) {
        String[] a=s.split("\\.");
        StringBuilder res=new StringBuilder();
        for(int i=a.length-1;i>=0;i--){
            if (a[i].equals("")) continue;
            if (res.length() > 0) res.append(".");
            res.append(a[i]);
        }
        return res.toString();
    }
}
```

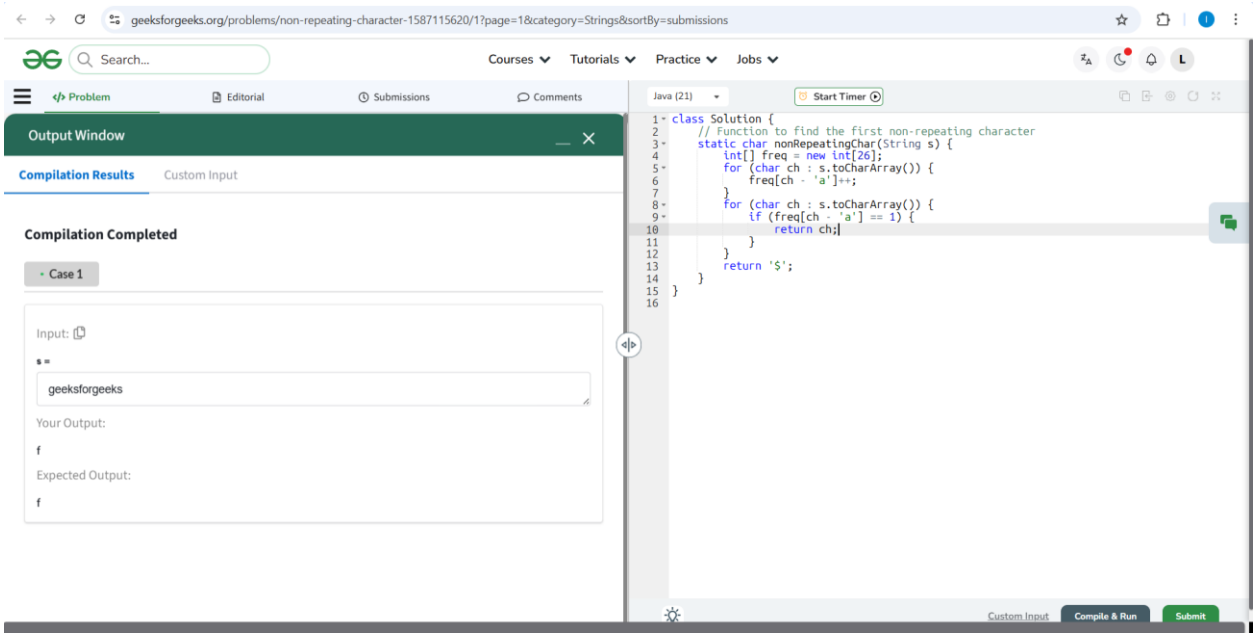
OUTPUT:



28. Given a string **s** consisting of **lowercase** English Letters. return the first non-repeating character in **s**. If there is no non-repeating character, return **'$'**.

```
class Solution {
    // Function to find the first non-repeating character
    static char nonRepeatingChar(String s) {
        int[] freq = new int[26];
        for (char ch : s.toCharArray()) {
            freq[ch - 'a']++;
        }
        for (char ch : s.toCharArray()) {
            if (freq[ch - 'a'] == 1) {
                return ch;
            }
        }
        return '$';
    }
}
```

OUTPUT:

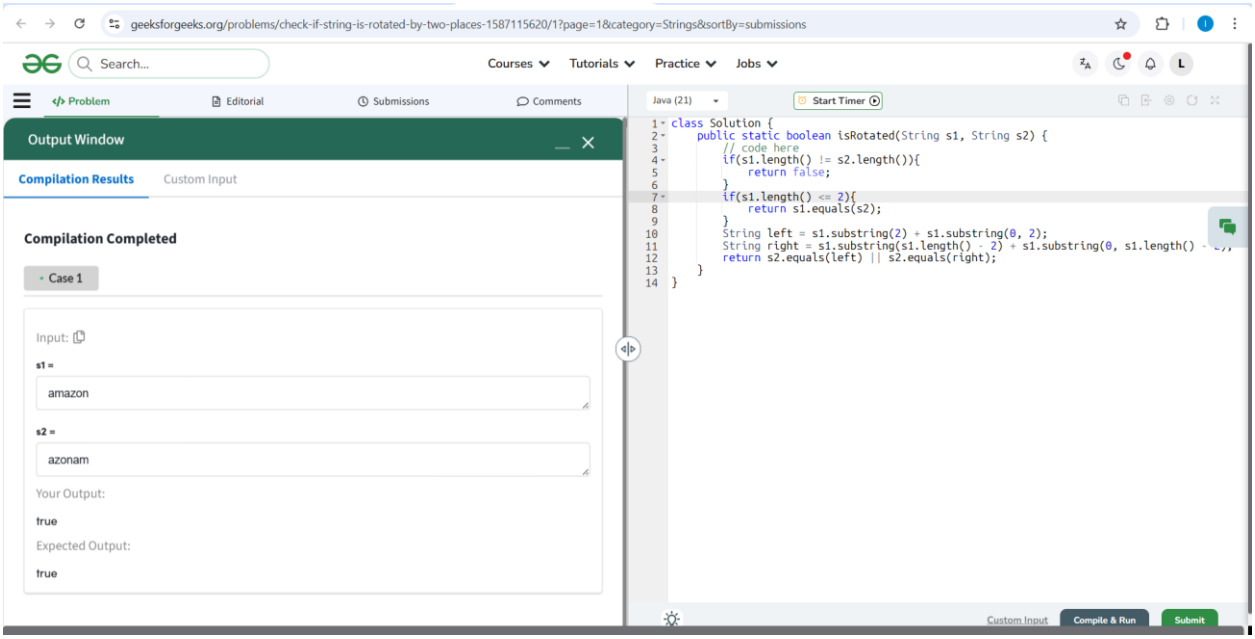


29. Given two strings **s1** and **s2**. Return true if the string **s2** can be obtained by rotating (**in any direction**) string **s1** by **exactly 2** places, otherwise, false.

Note: Both rotations should be performed in same direction chosen initially.

```
class Solution {
    public static boolean isRotated(String s1, String s2) {
        // code here
        if(s1.length() != s2.length()){
            return false;
        }
        if(s1.length() <= 2){
            return s1.equals(s2);
        }
        String left = s1.substring(2) + s1.substring(0, 2);
        String right = s1.substring(s1.length() - 2) + s1.substring(0, s1.length() - 2);
        return s2.equals(left) || s2.equals(right);
    }
}
```

OUTPUT:

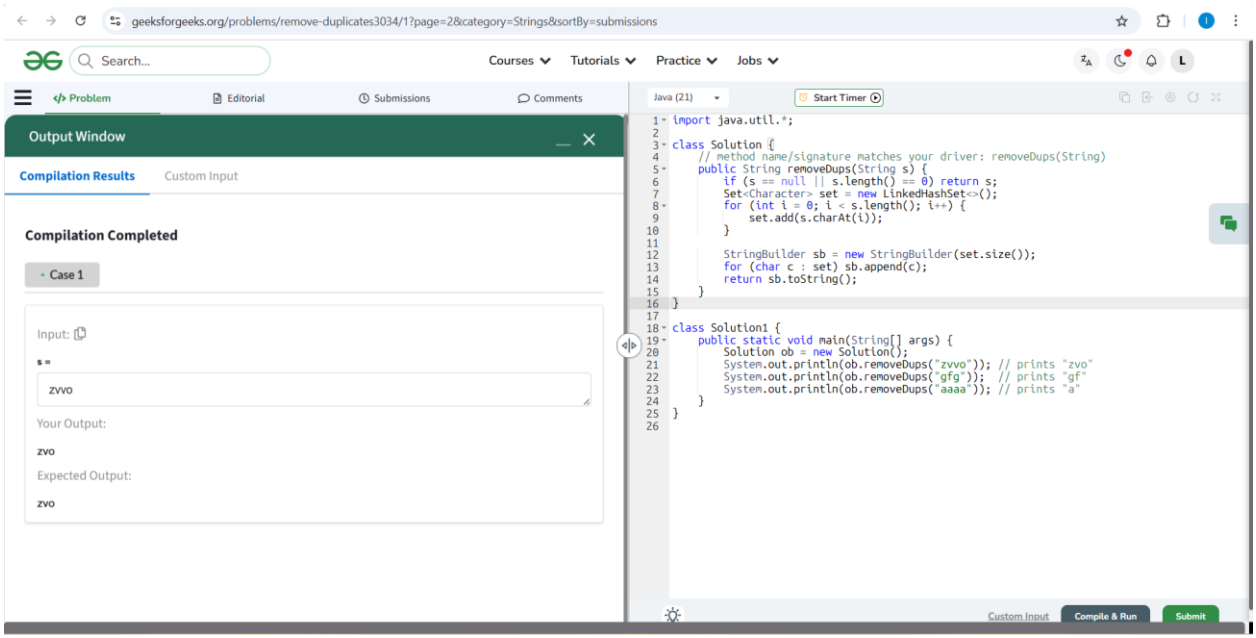


30. Given a string **s** without spaces, the task is to remove all duplicate characters from it, keeping only the first occurrence.

Note: The original order of characters must be kept the same.

```
import java.util.*;
class Solution {
   // method name/signature matches your driver: removeDups(String)
   public String removeDups(String s) {
      if (s == null || s.length() == 0) return s;
      Set<Character> set = new LinkedHashSet<>();
      for (int i = 0; i < s.length(); i++) {
         set.add(s.charAt(i));
      }
      StringBuilder sb = new StringBuilder(set.size());
      for (char c : set) sb.append(c);
      return sb.toString();
   }
}
class Solution1 {
   public static void main(String[] args) {
      Solution ob = new Solution();
      System.out.println(ob.removeDups("zvvo")); // prints "zvo"
      System.out.println(ob.removeDups("gfg"));  // prints "gf"
      System.out.println(ob.removeDups("aaaa")); // prints "a"
   }
}
```

OUTPUT:


geeksforgeeks.org/problems/remove-duplicates3034/1?page=2&category=Strings&sortBy=submissions
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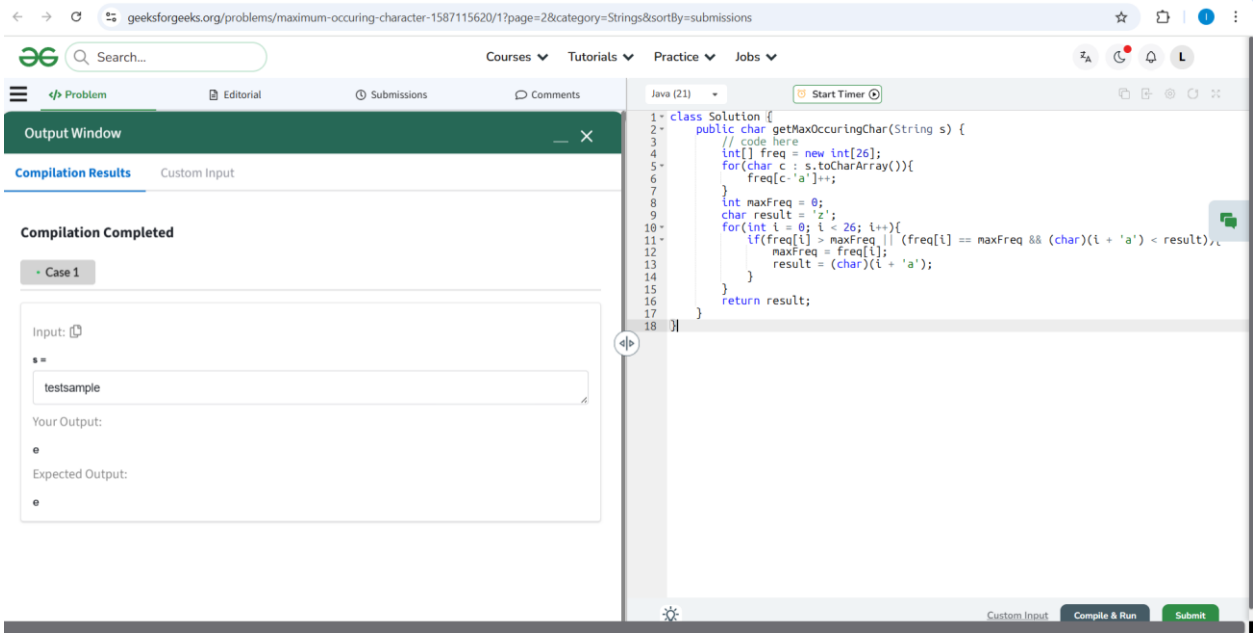
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
s =
zvvo
Your Output:
zvo
Expected Output:
zvo
Java (21)
Start Timer
import java.util.*;
class Solution {
// method name/signature matches your driver: removeDups(String)
public String removeDups(String s) {
if (s == null || s.length() == 0) return s;
Set<Character> set = new LinkedHashSet<>();
for (int i = 0; i < s.length(); i++) {
set.add(s.charAt(i));
}
StringBuilder sb = new StringBuilder(set.size());
for (char c : set) sb.append(c);
return sb.toString();
}
}
class Solution1 {
public static void main(String[] args) {
Solution ob = new Solution();
System.out.println(ob.removeDups("zvvo")); // prints "zvo"
System.out.println(ob.removeDups("gfg")); // prints "gf"
System.out.println(ob.removeDups("aaaa")); // prints "a"
}
}
Custom Input
Compile & Run
Submit

31. Given a string **s** of lowercase alphabets. The task is to find the maximum occurring character in the string **s**. If more than one character occurs the maximum number of times then print the lexicographically smaller character.

```
class Solution {
    public char getMaxOccuringChar(String s) {
        // code here
        int[] freq = new int[26];
        for(char c : s.toCharArray()){
            freq[c-'a']++;
        }
        int maxFreq = 0;
        char result = 'z';
        for(int i = 0; i < 26; i++){
            if(freq[i] > maxFreq || (freq[i] == maxFreq && (char)(i + 'a') < result)){
                maxFreq = freq[i];
                result = (char)(i + 'a');
            }
        }
        return result;
    }
}
```

OUTPUT:



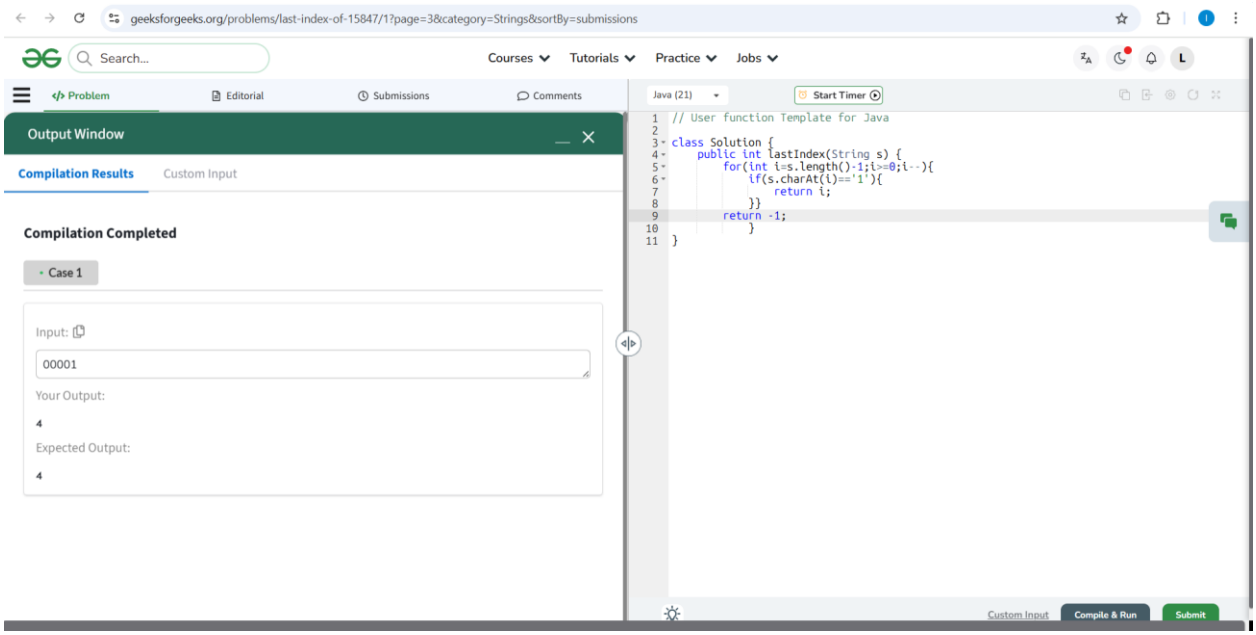
32. Given a string **s** consisting of only '**0**'s and '**1**'s, find the last index of the '1' present.

Note: If '1' is not present, return "-1"

```
// User function Template for Java

class Solution {
    public int lastIndex(String s) {
        for(int i=s.length()-1;i>=0;i--){
            if(s.charAt(i)=='1'){
                return i;
            }}
        return -1;
            }
}
```

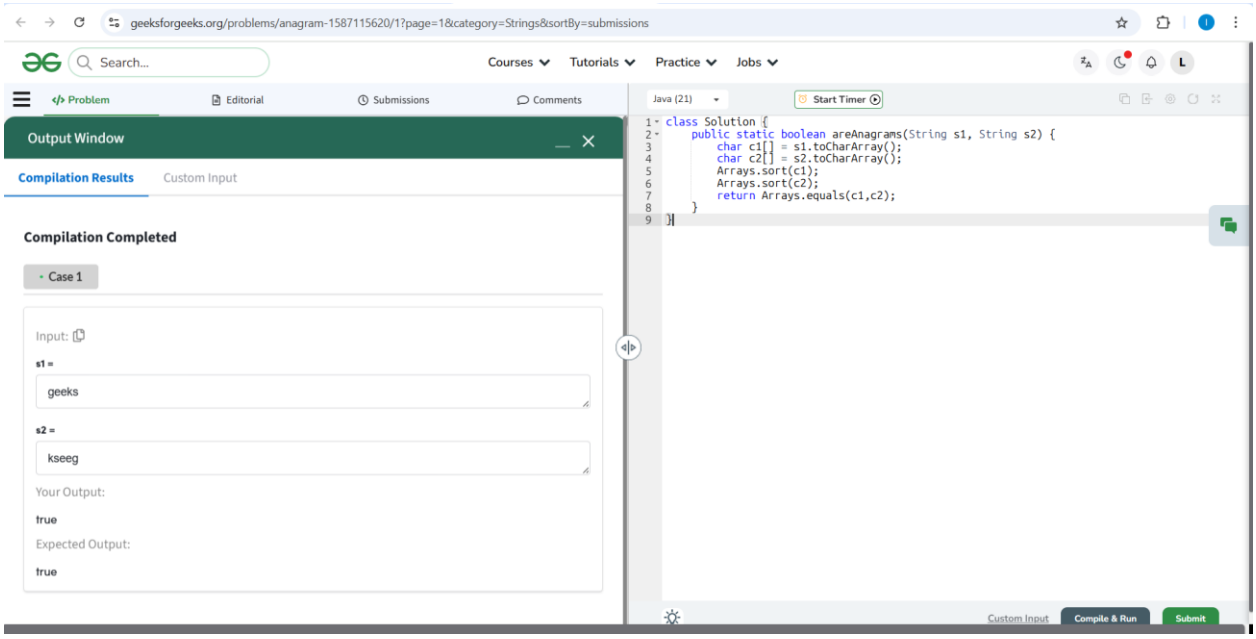
OUTPUT:



33. Given two non-empty strings **s1** and **s2**, consisting only of lowercase English letters, determine whether they are **anagrams** of each other or not.
Two strings are considered **anagrams** if they contain the **same characters** with exactly the **same frequencies**, regardless of their order.

```
class Solution {
    public static boolean areAnagrams(String s1, String s2) {
        char c1[] = s1.toCharArray();
        char c2[] = s2.toCharArray();
        Arrays.sort(c1);
        Arrays.sort(c2);
        return Arrays.equals(c1,c2);
    }
}
```

OUTPUT:

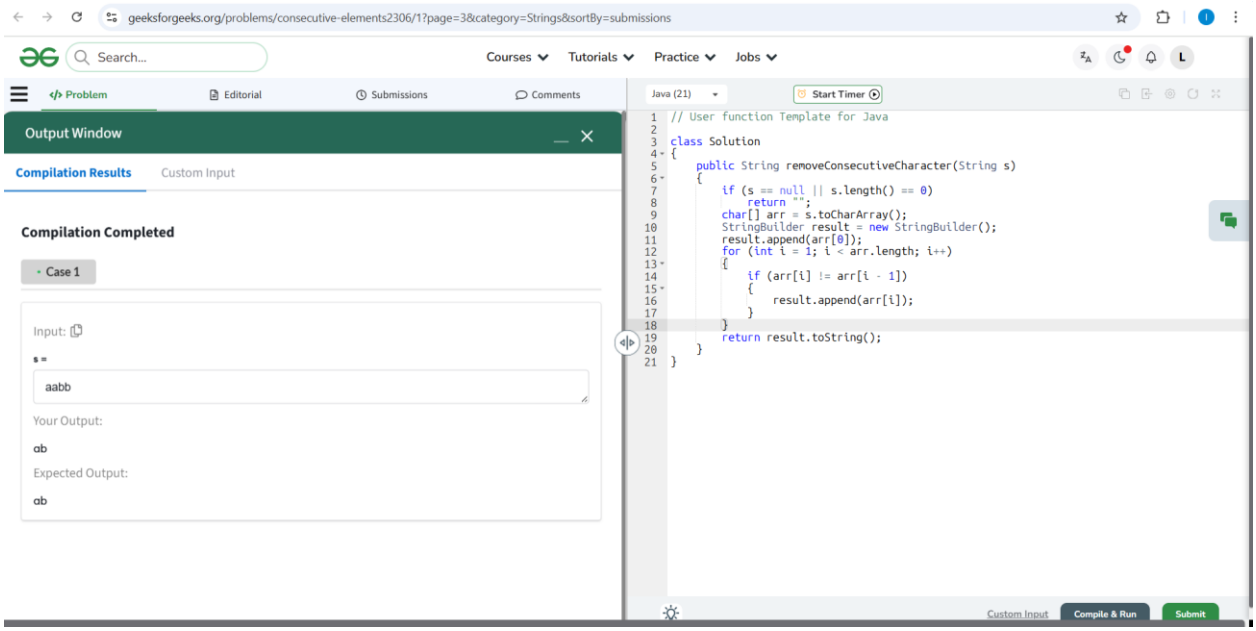


34. You are given a string **s**, consisting of lowercase alphabets. Your task is to remove consecutive duplicate characters from the string.

```
// User function Template for Java

class Solution
{
    public String removeConsecutiveCharacter(String s)
    {
        if (s == null || s.length() == 0)
            return "";
        char[] arr = s.toCharArray();
        StringBuilder result = new StringBuilder();
        result.append(arr[0]);
        for (int i = 1; i < arr.length; i++)
        {
            if (arr[i] != arr[i - 1])
            {
                result.append(arr[i]);
            }
        }
        return result.toString();
    }
}
```

OUTPUT:



Programs on Series Problems

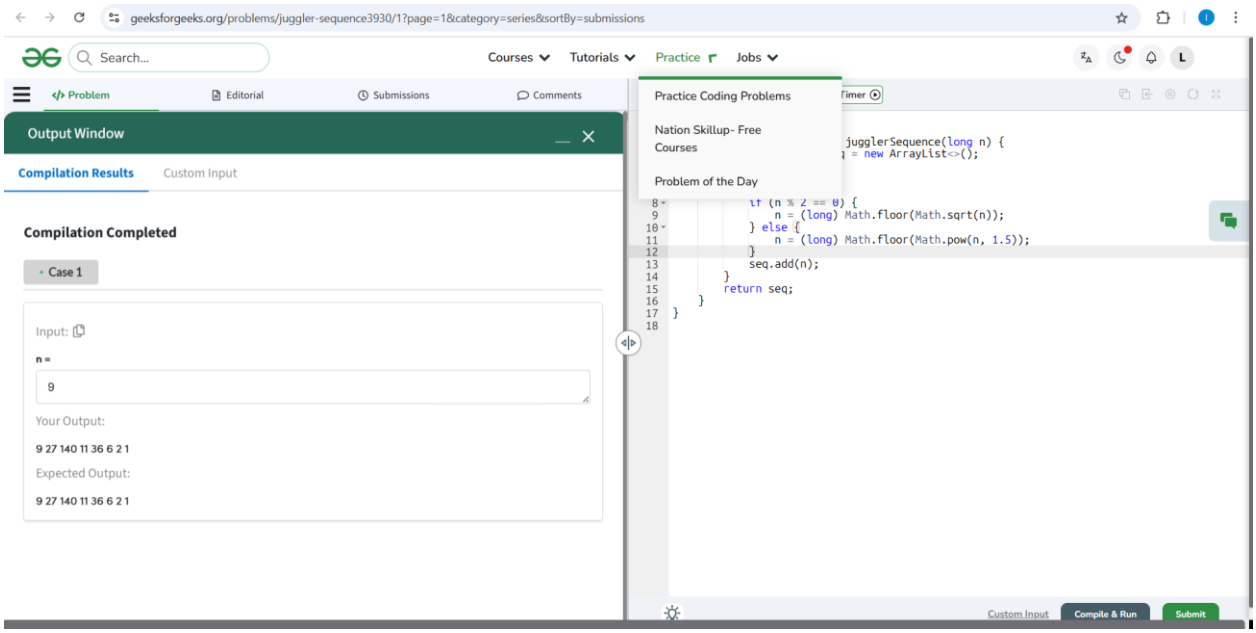
35. Juggler Sequence is a series of integers in which the first term starts with a positive integer number *a* and the remaining terms are generated from the immediate previous term using the below recurrence relation:

$$a_{k+1} = \begin{cases} \lfloor a_k^{1/2} \rfloor & \text{for even } a_k \\ \lfloor a_k^{3/2} \rfloor & \text{for odd } a_k, \end{cases}$$

Given a number n, find the Juggler Sequence for this number as the first term of the sequence until it becomes 1.

```
import java.util.*;
class Solution {
   public ArrayList<Long> jugglerSequence(long n) {
      ArrayList<Long> seq = new ArrayList<>();
      seq.add(n);
      while (n != 1) {
         if (n % 2 == 0) {
            n = (long) Math.floor(Math.sqrt(n));
         } else {
            n = (long) Math.floor(Math.pow(n, 1.5));
         }
         seq.add(n);
      }
      return seq;
   }
}
```

OUTPUT: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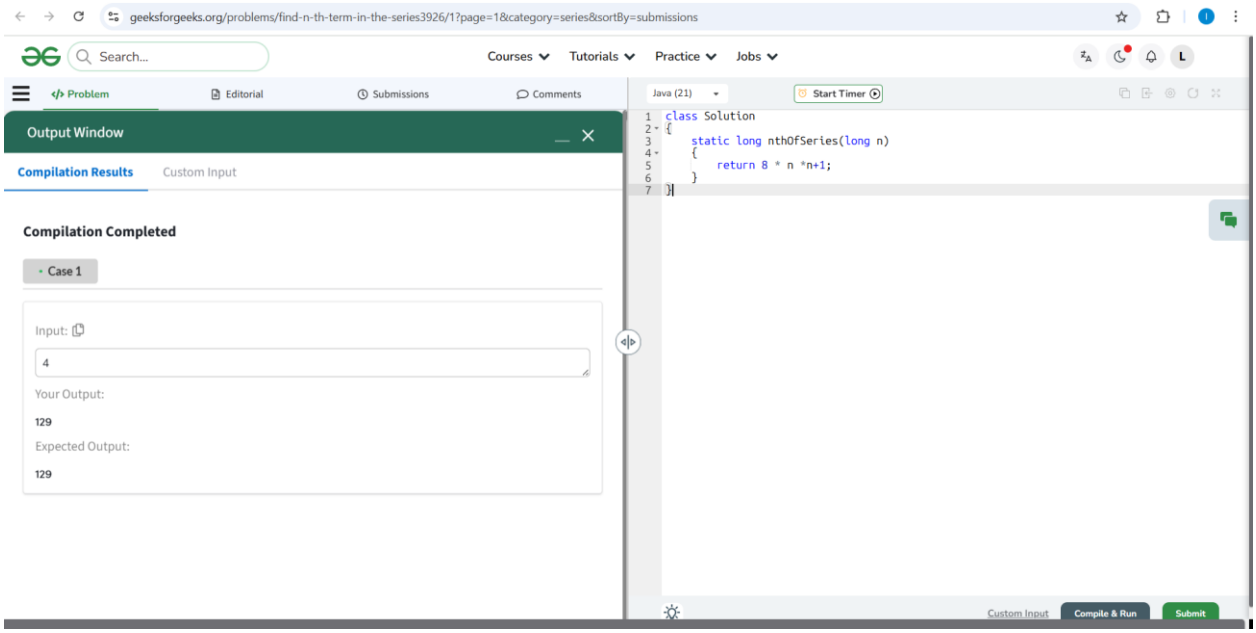
Problem of the Day
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
n =
9
Your Output:
9 27 140 11 36 6 2 1
Expected Output:
9 27 140 11 36 6 2 1
jugglerSequence(long n) {
= new ArrayList<>();
if (n % 2 == 0) {
n = (long) Math.floor(Math.sqrt(n));
} else {
n = (long) Math.floor(Math.pow(n, 1.5));
}
seq.add(n);
return seq;
Custom Input
Compile & Run
Submit

36. Given a series 9, 33, 73, 129... Find the n-th term of the series.

```
class Solution
{
   static long nthOfSeries(long n)
   {
      return 8 * n *n+1;
   }
}
```

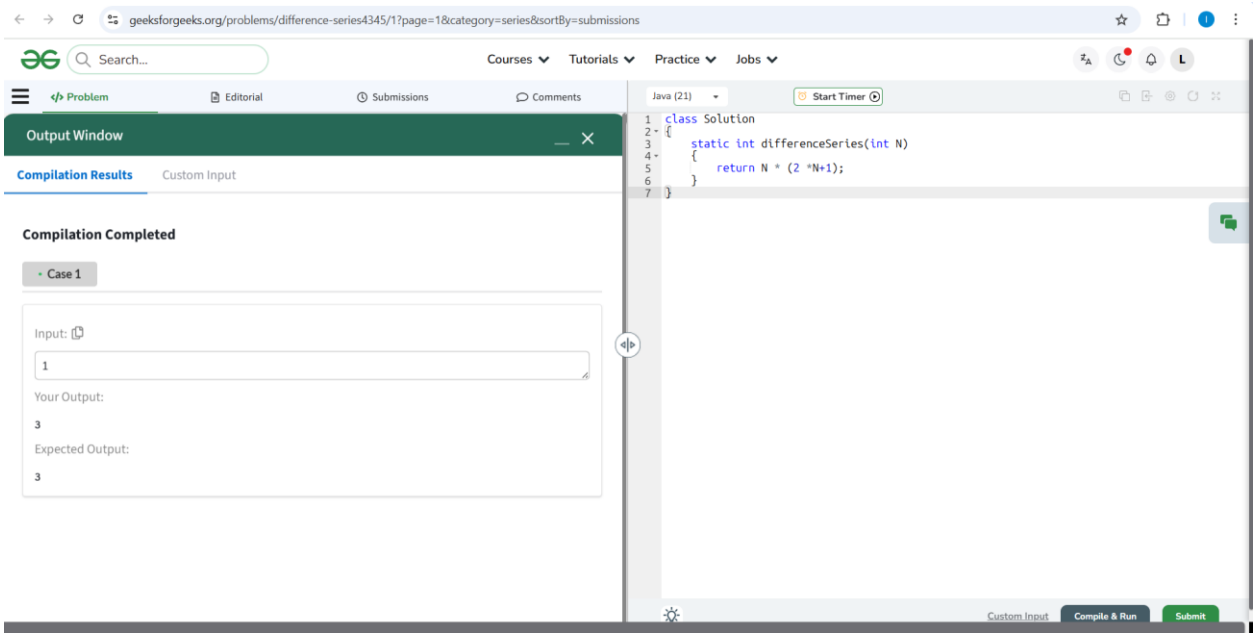
OUTPUT:



37. Given a series of numbers 3,10,21,36 …., and series starting from N = 1, find the pattern and output the N'th value of the above series.

```
class Solution
{
   static int differenceSeries(int N)
   {
      return N * (2 *N+1);
   }
}
```

OUTPUT:

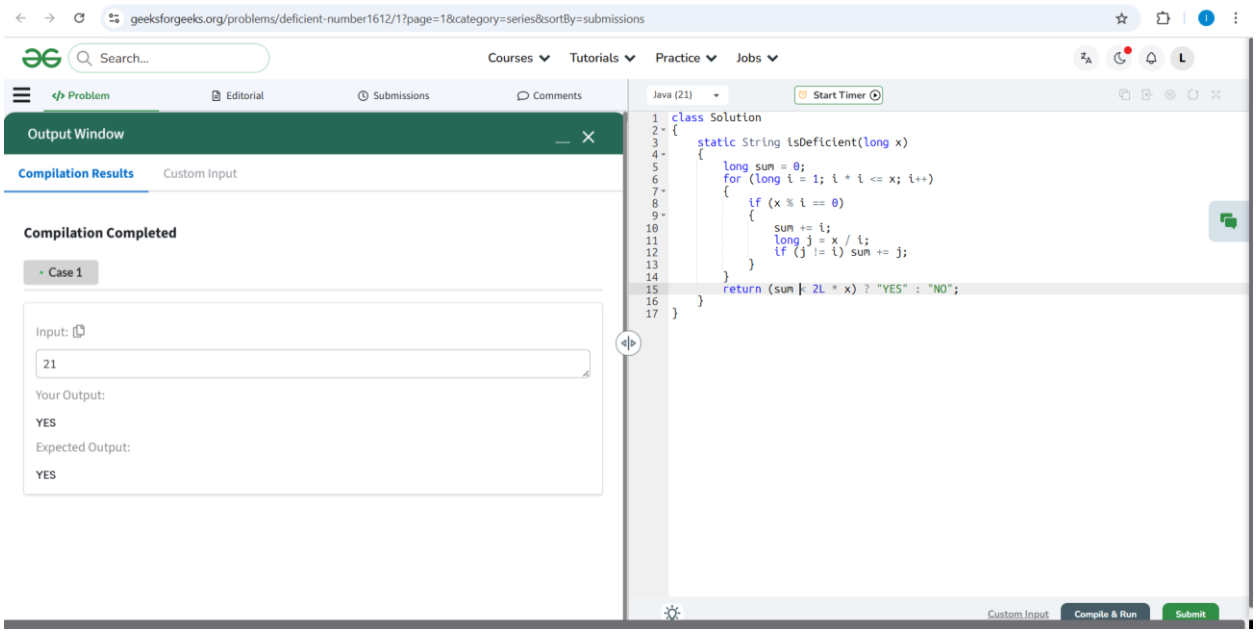


38. â€‹Given a number x, your task is to find if this number is Deficient number or not. A number x is said to be Deficient Number if sum of all the divisors of the number denoted by *divisorsSum(x)* is less than twice the value of the number x. And the difference between these two values is called the **deficiency**.

Mathematically, if below condition holds the number is said to be Deficient:
divisorsSum(x) < 2*x
deficiency = (2*x) - divisorsSum(x)

```
class Solution
{
   static String isDeficient(long x)
   {
      long sum = 0;
      for (long i = 1; i * i <= x; i++)
      {
         if (x % i == 0)
         {
            sum += i;
            long j = x / i;
            if (j != i) sum += j;
         }
      }
      return (sum < 2L * x) ? "YES" : "NO";
   }
}
```

OUTPUT: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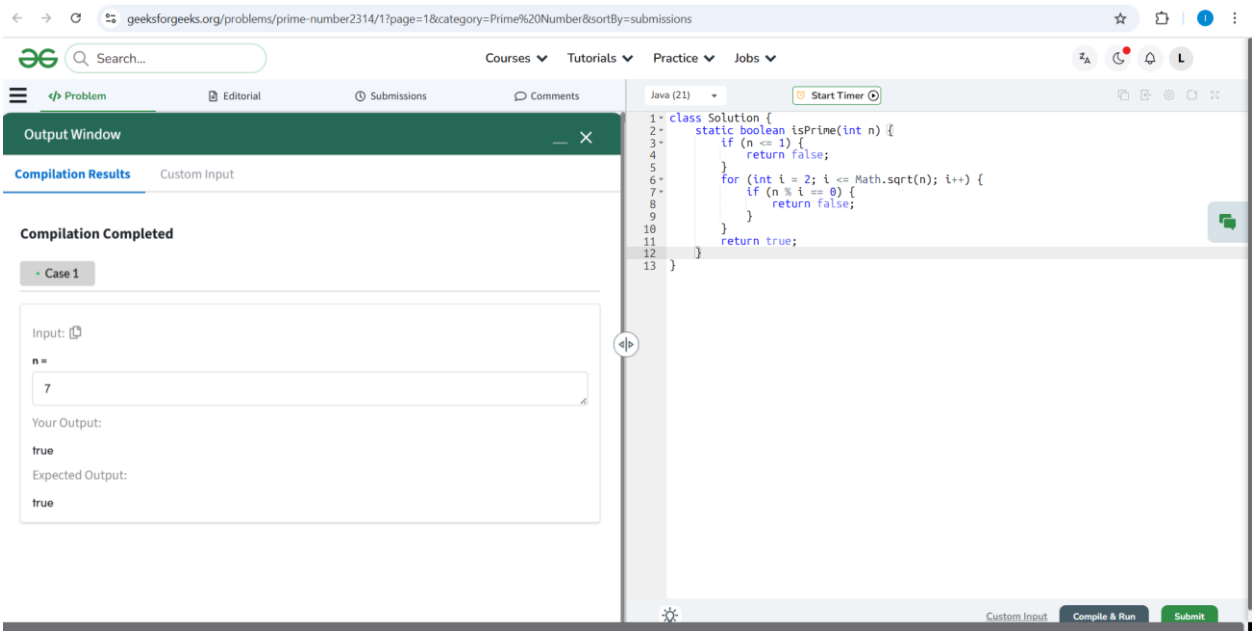
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
21
Your Output:
YES
Expected Output:
YES
Java (21)
Start Timer
class Solution
{
static String isDeficient(long x)
{
long sum = 0;
for (long i = 1; i * i <= x; i++)
{
if (x % i == 0)
{
sum += i;
long j = x / i;
if (j != i) sum += j;
}
}
return (sum < 2L * x) ? "YES" : "NO";
}
}
Custom Input
Compile & Run
Submit

Programs on Prime Numbers Problems

39. Given a number **n**, determine whether it is a **prime number** or not.
Note: A prime number is a number greater than 1 that has no positive divisors other than 1 and itself.

```
class Solution {
    static boolean isPrime(int n) {
        if (n <= 1) {
            return false;
        }
        for (int i = 2; i <= Math.sqrt(n); i++) {
            if (n % i == 0) {
                return false;
            }
        }
        return true;
    }
}
```

OUTPUT:

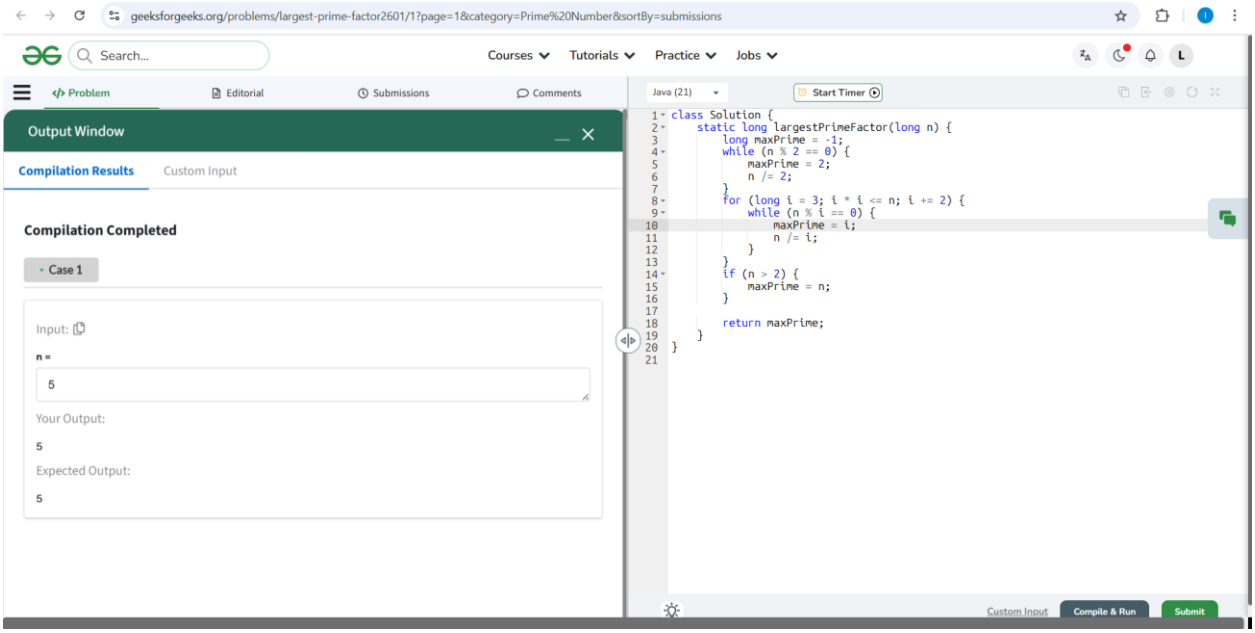


40. Given a number **n**, your task is to find the largest prime factor of n.

```
class Solution {
   static long largestPrimeFactor(long n) {
      long maxPrime = -1;
      while (n % 2 == 0) {
         maxPrime = 2;
         n /= 2;
      }
      for (long i = 3; i * i <= n; i += 2) {
         while (n % i == 0) {
            maxPrime = i;
            n /= i;
         }
      }
      if (n > 2) {
         maxPrime = n;
      }

      return maxPrime;
   }
}
```

OUTPUT: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Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
n =
5
Your Output:
5
Expected Output:
5
Java (21)
Start Timer
class Solution {
static long largestPrimeFactor(long n) {
long maxPrime = -1;
while (n % 2 == 0) {
maxPrime = 2;
n /= 2;
}
for (long i = 3; i * i <= n; i += 2) {
while (n % i == 0) {
maxPrime = i;
n /= i;
}
}
if (n > 2) {
maxPrime = n;
}
return maxPrime;
}
}
Custom Input
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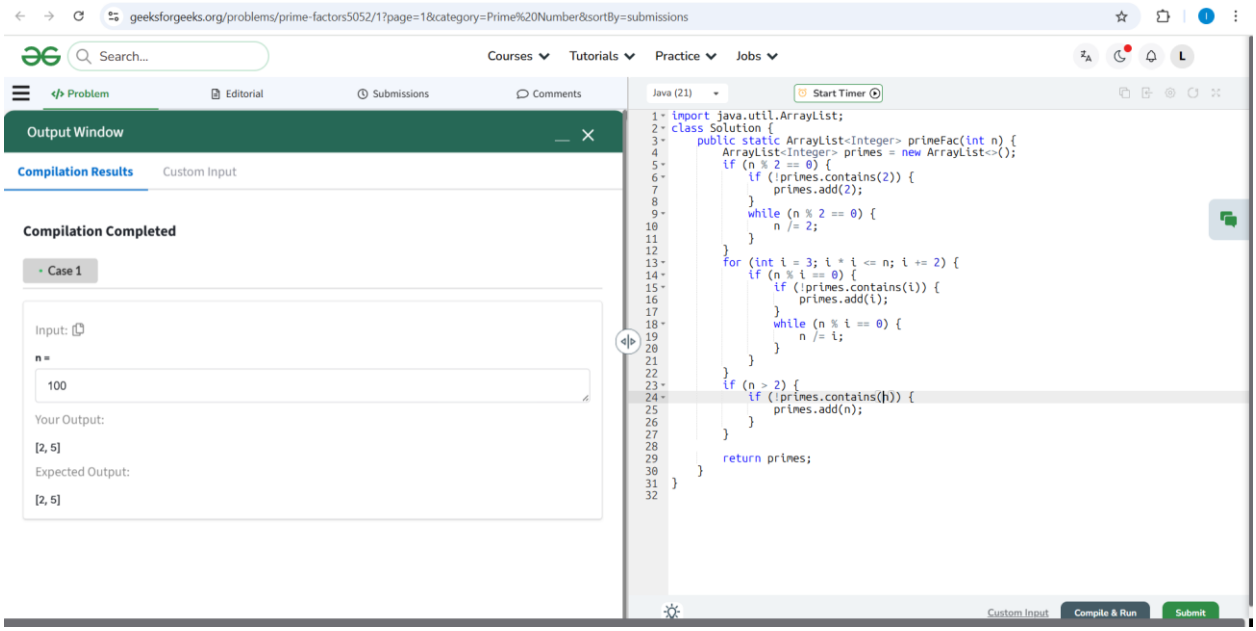
41. Given a number **n**. Find its **unique** prime factors in **increasing order**.

```
import java.util.ArrayList;
class Solution {
    public static ArrayList<Integer> primeFac(int n) {
        ArrayList<Integer> primes = new ArrayList<>();
        if (n % 2 == 0) {
            if (!primes.contains(2)) {
                primes.add(2);
            }
            while (n % 2 == 0) {
                n /= 2;
            }
        }
        for (int i = 3; i * i <= n; i += 2) {
            if (n % i == 0) {
                if (!primes.contains(i)) {
                    primes.add(i);
                }
                while (n % i == 0) {
                    n /= i;
                }
            }
        }
        if (n > 2) {
            if (!primes.contains(n)) {
                primes.add(n);
            }
        }

        return primes;
    }
}
```

OUTPUT:


geeksforgeeks.org/problems/prime-factors5052/1?page=1&category=Prime%20Number&sortBy=submissions
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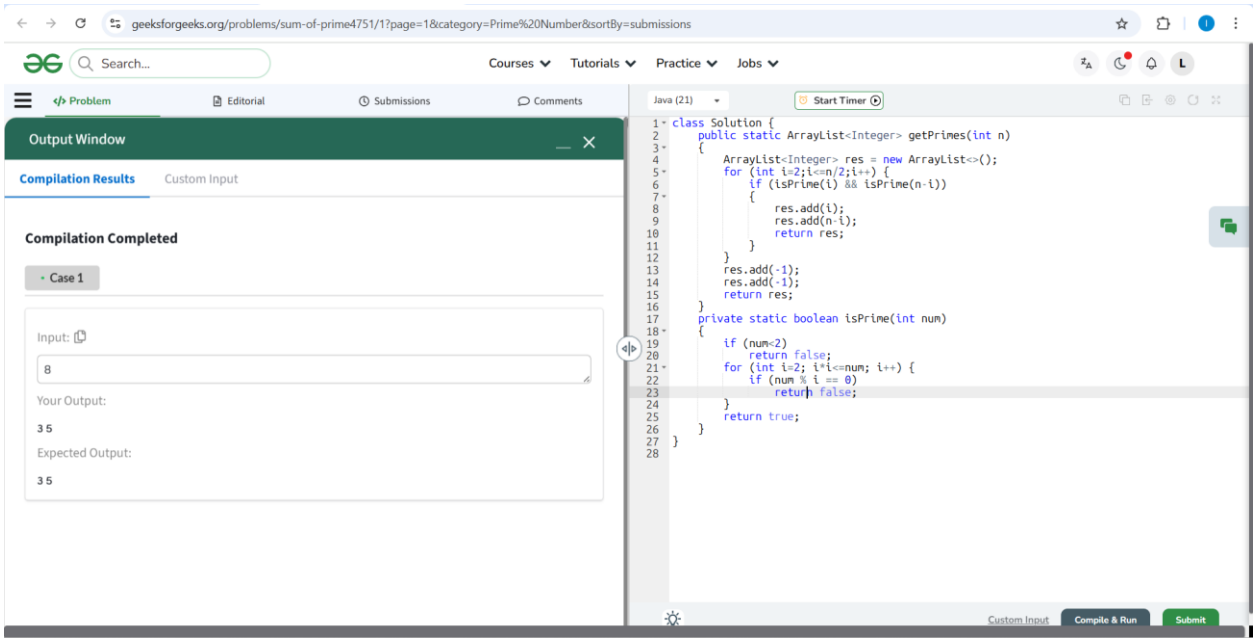
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
n =
100
Your Output:
[2, 5]
Expected Output:
[2, 5]
Java (21)
Start Timer
import java.util.ArrayList;
class Solution {
public static ArrayList<Integer> primeFac(int n) {
ArrayList<Integer> primes = new ArrayList<>();
if (n % 2 == 0) {
if (!primes.contains(2)) {
primes.add(2);
}
while (n % 2 == 0) {
n /= 2;
}
}
for (int i = 3; i * i <= n; i += 2) {
if (n % i == 0) {
if (!primes.contains(i)) {
primes.add(i);
}
while (n % i == 0) {
n /= i;
}
}
}
if (n > 2) {
if (!primes.contains(n)) {
primes.add(n);
}
}
return primes;
}
}
Custom Input
Compile & Run
Submit

42. Given a number n, find out if n can be expressed as a+b, where both a and b are prime numbers. If such a pair exists, return the values of a and b, otherwise return [-1,-1] as an array of size 2.
Note: If [a, b] is one solution with a <= b, and [c, d] is another solution with c <= d, and a < c then [a, b] is considered as our answer.

```
class Solution {
   public static ArrayList<Integer> getPrimes(int n)
   {
      ArrayList<Integer> res = new ArrayList<>();
      for (int i=2;i<=n/2;i++) {
         if (isPrime(i) && isPrime(n-i))
         {
            res.add(i);
            res.add(n-i);
            return res;
         }
      }
      res.add(-1);
      res.add(-1);
      return res;
   }
   private static boolean isPrime(int num)
   {
      if (num<2)
         return false;
      for (int i=2; i*i<=num; i++) {
         if (num % i == 0)
            return false;
      }
      return true;
   }
}
```

OUTPUT:

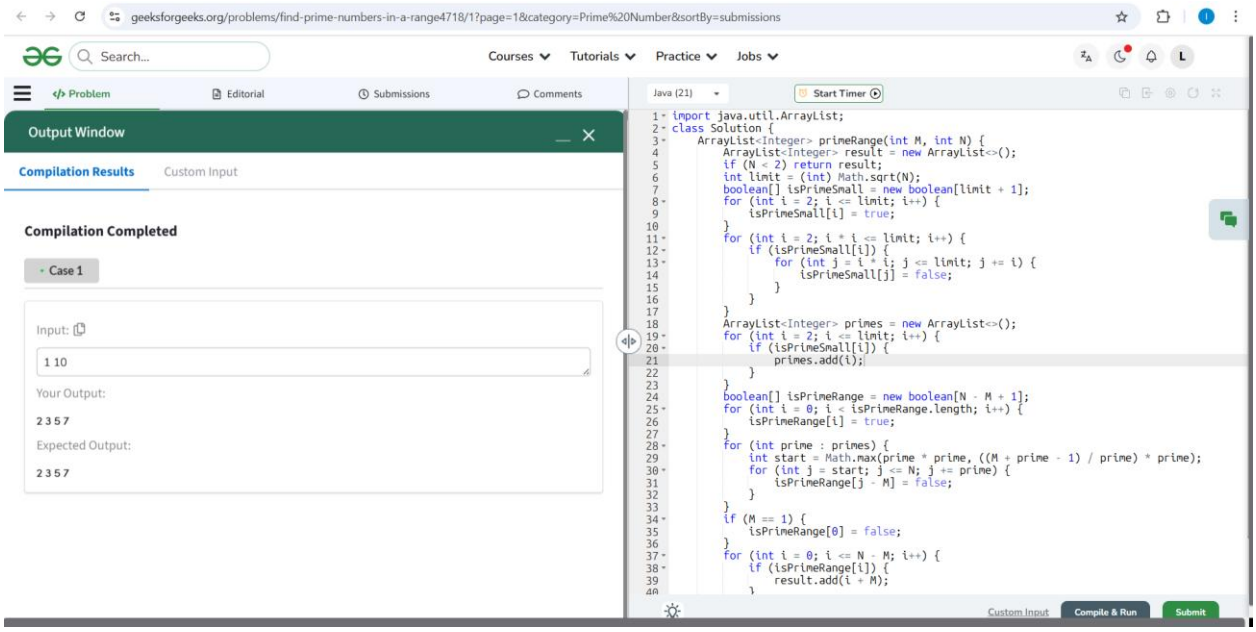


43. Given two integers M and N, generate all primes between M and N including M and N.

```
import java.util.ArrayList;
class Solution {
   ArrayList<Integer> primeRange(int M, int N) {
      ArrayList<Integer> result = new ArrayList<>();
      if (N < 2) return result;
      int limit = (int) Math.sqrt(N);
      boolean[] isPrimeSmall = new boolean[limit + 1];
      for (int i = 2; i <= limit; i++) {
         isPrimeSmall[i] = true;
      }
      for (int i = 2; i * i <= limit; i++) {
         if (isPrimeSmall[i]) {
            for (int j = i * i; j <= limit; j += i) {
               isPrimeSmall[j] = false;
            }
         }
      }
      ArrayList<Integer> primes = new ArrayList<>();
      for (int i = 2; i <= limit; i++) {
         if (isPrimeSmall[i]) {
            primes.add(i);
         }
      }
      boolean[] isPrimeRange = new boolean[N - M + 1];
      for (int i = 0; i < isPrimeRange.length; i++) {
         isPrimeRange[i] = true;
      }
      for (int prime : primes) {
         int start = Math.max(prime * prime, ((M + prime - 1) / prime) * prime);
         for (int j = start; j <= N; j += prime) {
            isPrimeRange[j - M] = false;
         }
      }
```

```
        if (M == 1) {
            isPrimeRange[0] = false;
        }
        for (int i = 0; i <= N - M; i++) {
            if (isPrimeRange[i]) {
                result.add(i + M);
            }
        }

        return result;
    }
}
```

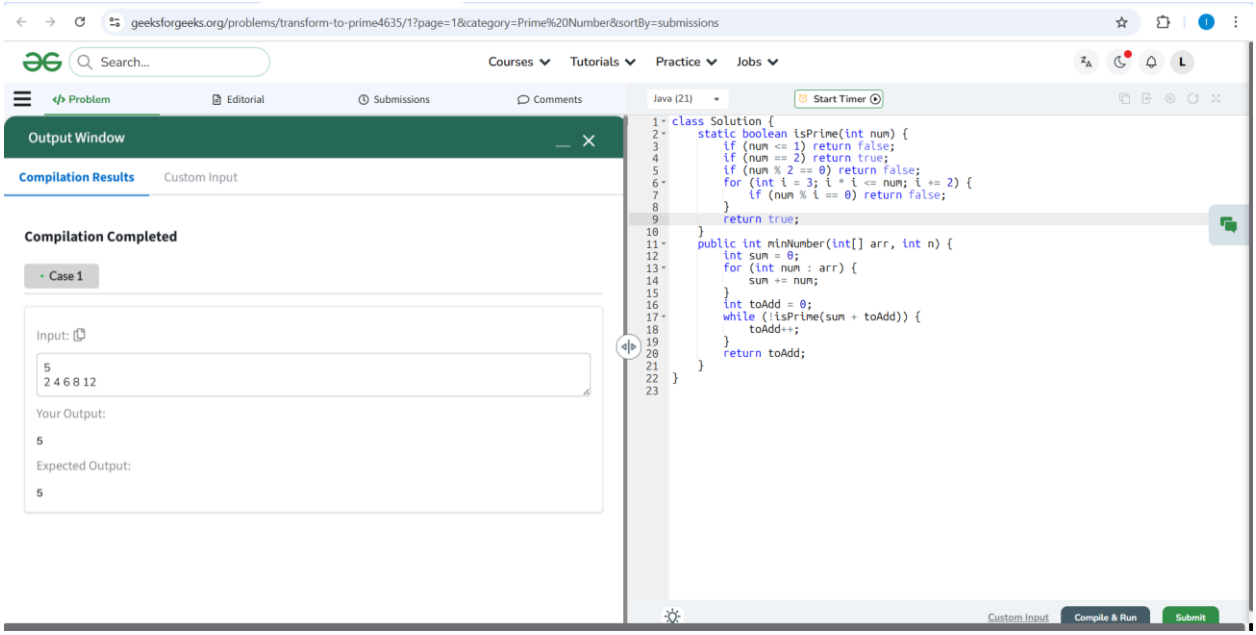
OUTPUT:



44. Given an array of **n** integers. Find the **minimum** non-negative number to be inserted in array, so that sum of all elements of array becomes **prime**.

```
class Solution {
    static boolean isPrime(int num) {
        if (num <= 1) return false;
        if (num == 2) return true;
        if (num % 2 == 0) return false;
        for (int i = 3; i * i <= num; i += 2) {
            if (num % i == 0) return false;
        }
        return true;
    }
    public int minNumber(int[] arr, int n) {
        int sum = 0;
        for (int num : arr) {
            sum += num;
        }
        int toAdd = 0;
        while (!isPrime(sum + toAdd)) {
            toAdd++;
        }
        return toAdd;
    }
}
```

OUTPUT:



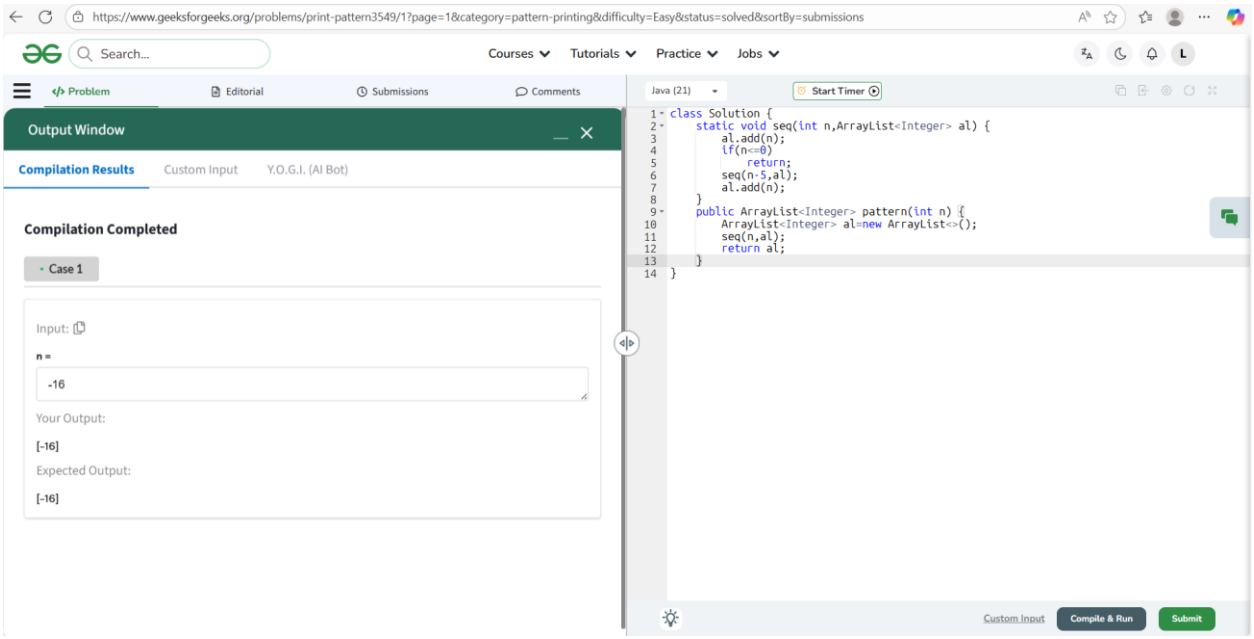
Programs on Pattern Problems

45. Given a number **n**, print a **sequence of numbers** starting from **n**. Each next number in the sequence is **n - 5**, and this continues recursively until the number becomes **less than** or **equal to 0**. After that, print the sequence in reverse order, **adding 5** each time, until it reaches back to the original number **n**.

Note: You must not use loops.class Solution

```
class Solution {
    static void seq(int n,ArrayList<Integer> al) {
        al.add(n);
        if(n<=0)
            return;
        seq(n-5,al);
        al.add(n);
    }
    public ArrayList<Integer> pattern(int n) {
        ArrayList<Integer> al=new ArrayList<>();
        seq(n,al);
        return al;
    }
}
```

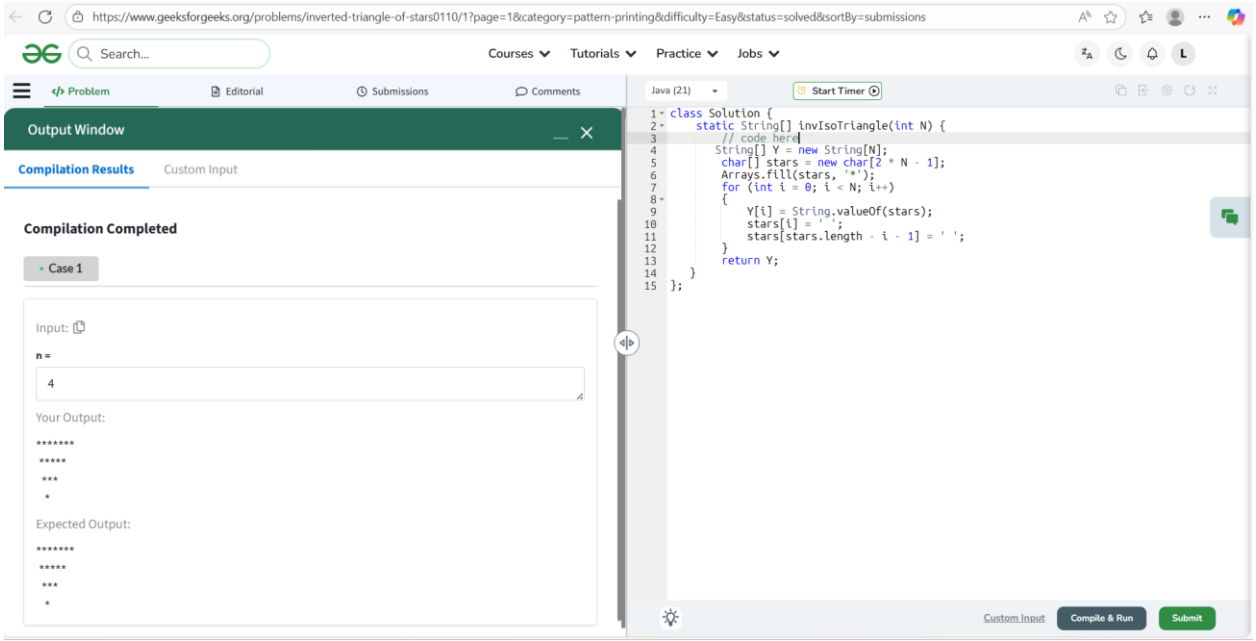
OUTPUT:



46. Given an integer **n**, print an inverted isosceles triangle of stars such that the height of the triangle is **n**.

```
class Solution {
   static String[] invIsoTriangle(int N) {
       // code here
      String[] Y = new String[N];
       char[] stars = new char[2 * N - 1];
       Arrays.fill(stars, '*');
       for (int i = 0; i < N; i++)
       {
          Y[i] = String.valueOf(stars);
          stars[i] = ' ';
          stars[stars.length - i - 1] = ' ';
       }
       return Y;
   }
};
```

OUTPUT:



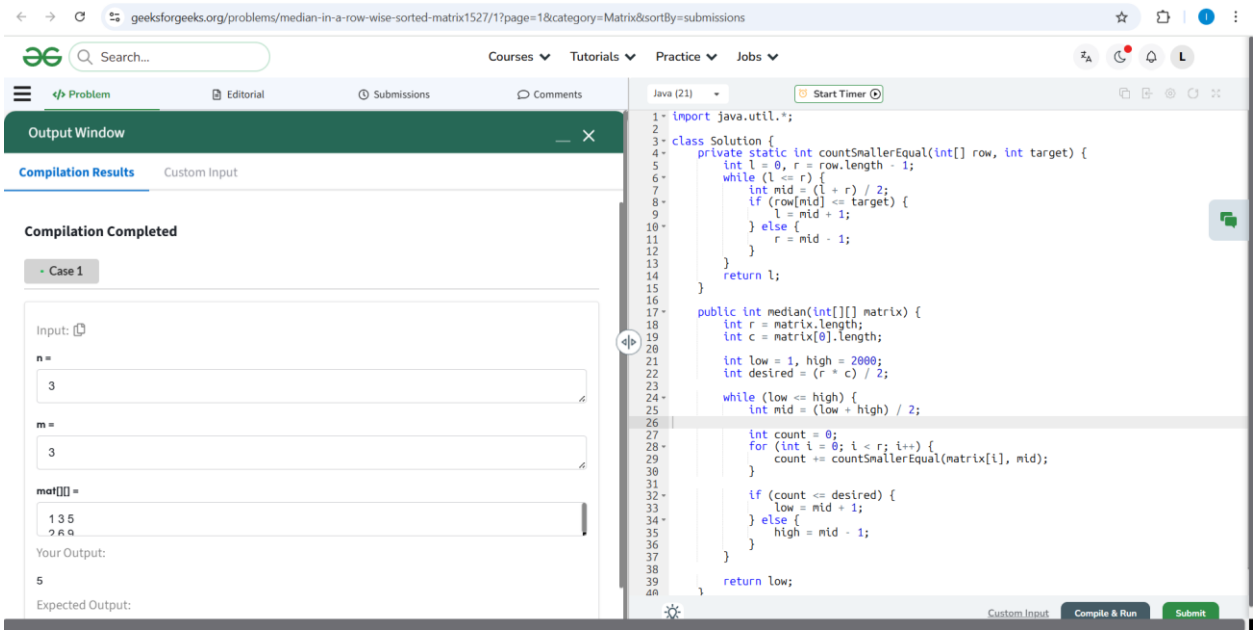
Programs on Matrices Problems

47. Given a **row-wise sorted** matrix **mat[][]** of size n*m, where the number of rows and columns is always **odd**. Return the **median** of the matrix.

```
import java.util.*;

class Solution {

    // Function to count elements <= target in a sorted row using binary search
    private static int countSmallerEqual(int[] row, int target) {
        int l = 0, r = row.length - 1;
        while (l <= r) {
            int mid = (l + r) / 2;
            if (row[mid] <= target) {
                l = mid + 1;  // move right
            } else {
                r = mid - 1;  // move left
            }
        }
        return l; // number of elements <= target
    }

    public int median(int[][] matrix) {
        int r = matrix.length;
        int c = matrix[0].length;

        int low = 1, high = 2000; // given constraints
        int desired = (r * c) / 2;

        while (low <= high) {
            int mid = (low + high) / 2;

            // count how many elements <= mid
            int count = 0;
            for (int i = 0; i < r; i++) {
                count += countSmallerEqual(matrix[i], mid);
            }

            if (count <= desired) {
                low = mid + 1;
            } else {
                high = mid - 1;
            }
        }

        return low;
```

```
    }
}
```

OUTPUT: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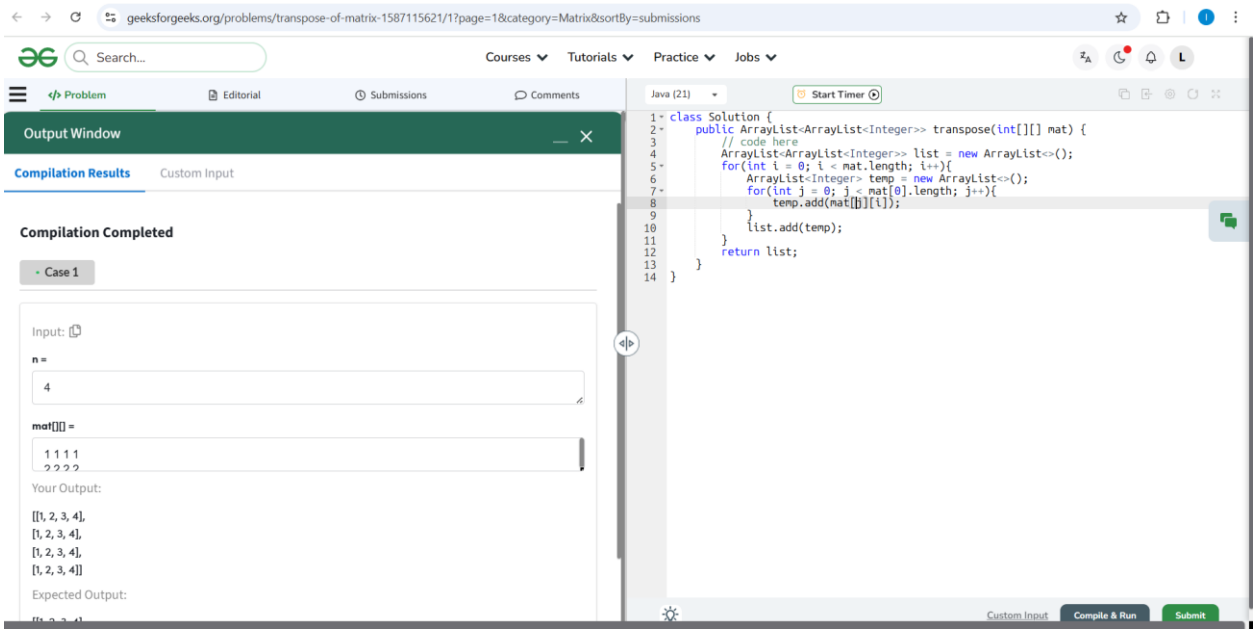
Output Window
Compilation Results
Custom Input
Compilation Completed
Case 1
Input:
n =
3
m =
3
mat[][] =
1 3 5
2 6 9
Your Output:
5
Expected Output:
Java (21)
Start Timer
import java.util.*;
class Solution {
private static int countSmallerEqual(int[] row, int target) {
int l = 0, r = row.length - 1;
while (l <= r) {
int mid = (l + r) / 2;
if (row[mid] <= target) {
l = mid + 1;
} else {
r = mid - 1;
}
}
return l;
}
public int median(int[][] matrix) {
int r = matrix.length;
int c = matrix[0].length;
int low = 1, high = 2000;
int desired = (r * c) / 2;
while (low <= high) {
int mid = (low + high) / 2;
int count = 0;
for (int i = 0; i < r; i++) {
count += countSmallerEqual(matrix[i], mid);
}
if (count <= desired) {
low = mid + 1;
} else {
high = mid - 1;
}
}
return low;
}
Custom Input
Compile & Run
Submit

48. You are given a square matrix of size **n x n**. Your task is to find the **transpose** of the given matrix.
The **transpose** of a matrix is obtained by converting all the rows to columns and all the columns to rows.

```
class Solution {
    public ArrayList<ArrayList<Integer>> transpose(int[][] mat) {
        // code here
        ArrayList<ArrayList<Integer>> list = new ArrayList<>();
        for(int i = 0; i < mat.length; i++){
            ArrayList<Integer> temp = new ArrayList<>();
            for(int j = 0; j < mat[0].length; j++){
                temp.add(mat[j][i]);
            }
            list.add(temp);
        }
        return list;
    }
}
```

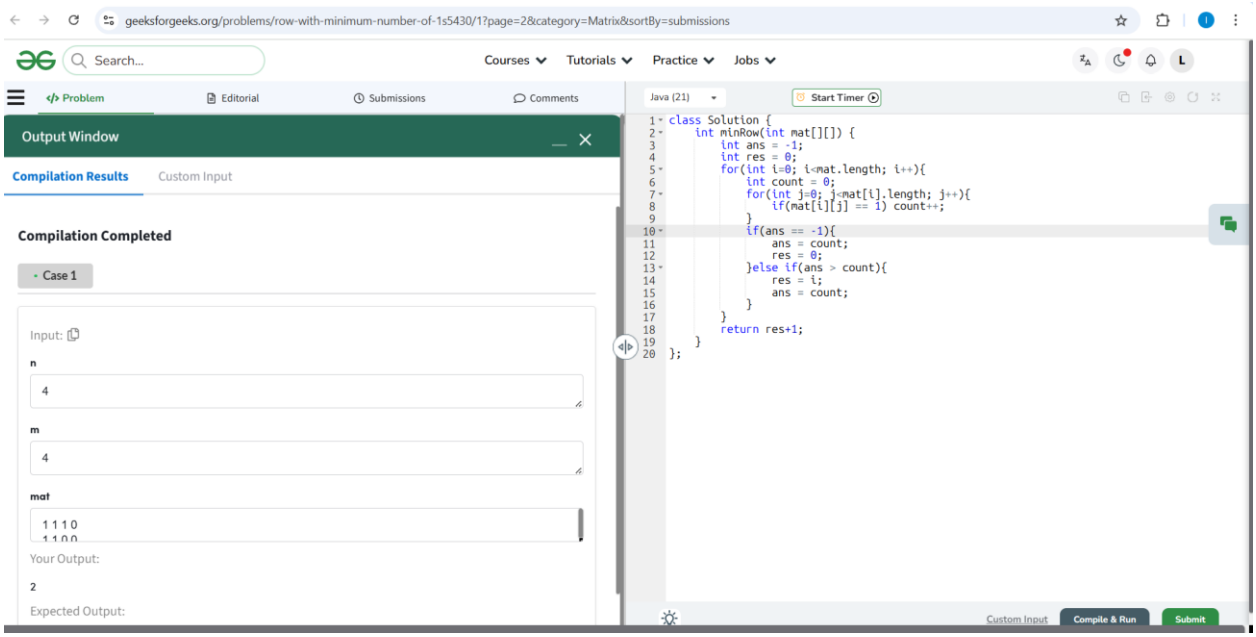
OUTPUT:



49. Given a 2D **binary matrix**(1-based indexed) **mat** of dimensions **nxm** , determine the **row** that contains the **minimum number** of **1's**.
Note: The matrix contains only **1's** and **0's**. Also, if two or more rows contain the **minimum number** of **1's**, the answer is the **lowest** of those **indices**.

```
class Solution {
    int minRow(int mat[][]) {
        int ans = -1;
        int res = 0;
        for(int i=0; i<mat.length; i++){
            int count = 0;
            for(int j=0; j<mat[i].length; j++){
                if(mat[i][j] == 1) count++;
            }
            if(ans == -1){
                ans = count;
                res = 0;
            }else if(ans > count){
                res = i;
                ans = count;
            }
        }
        return res+1;
    }
};
```

OUTPUT:



50. Given a square matrix of size **n*n**, print the **sum of upper and lower triangular elements**. Upper Triangle consists of elements on the diagonal and above it. The lower triangle consists of elements on the diagonal and below it.

```
class Solution {
    public static ArrayList<Integer> sumTriangles(int[][] mat) {
        int n = mat.length;
        int upperSum = 0;
        int lowerSum = 0;
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                if (j >= i)
                    upperSum += mat[i][j];
                if (j <= i)
                    lowerSum += mat[i][j];
            }
        }
        ArrayList<Integer> ans = new ArrayList<>();
        ans.add(upperSum);
        ans.add(lowerSum);
        return ans;
    }
}
```

OUTPUT: