Experiment List for Programming Ability and Logic Building-2

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Batch : 2CSE5

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Week : 19/1/26 to 25/1/26

Lecture : 1 & 2

EXPERIMENT 1

Given an array arr[] of positive integers, where each value represents the number of chocolates in a packet. Each packet can have a variable number of chocolates. There are m students, the task is to distribute chocolate packets among m students such that -

i. Each student gets exactly one packet.

ii. The difference between maximum number of chocolates given to a student and minimum number of chocolates given to a student is minimum and return that minimum possible difference.

Examples:

Input: arr = [3, 4, 1, 9, 56, 7, 9, 12], m = 5

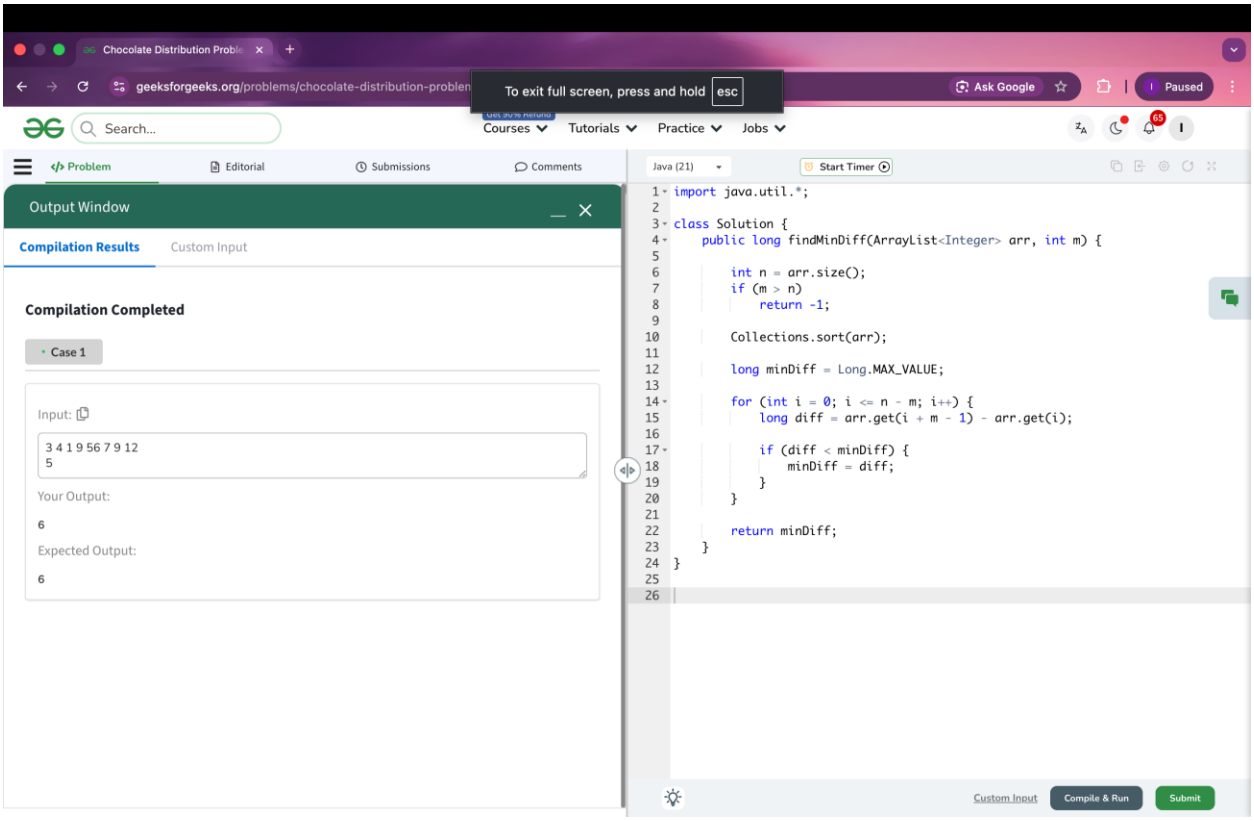
Output: 6

Explanation: The minimum difference between maximum chocolates and minimum chocolates is 9 - 3 = 6 by choosing following m packets :[3, 4, 9, 7, 9].

Constraints:

1 ≤ m <= arr.size ≤ 105

1 ≤ arr[i] ≤ 109



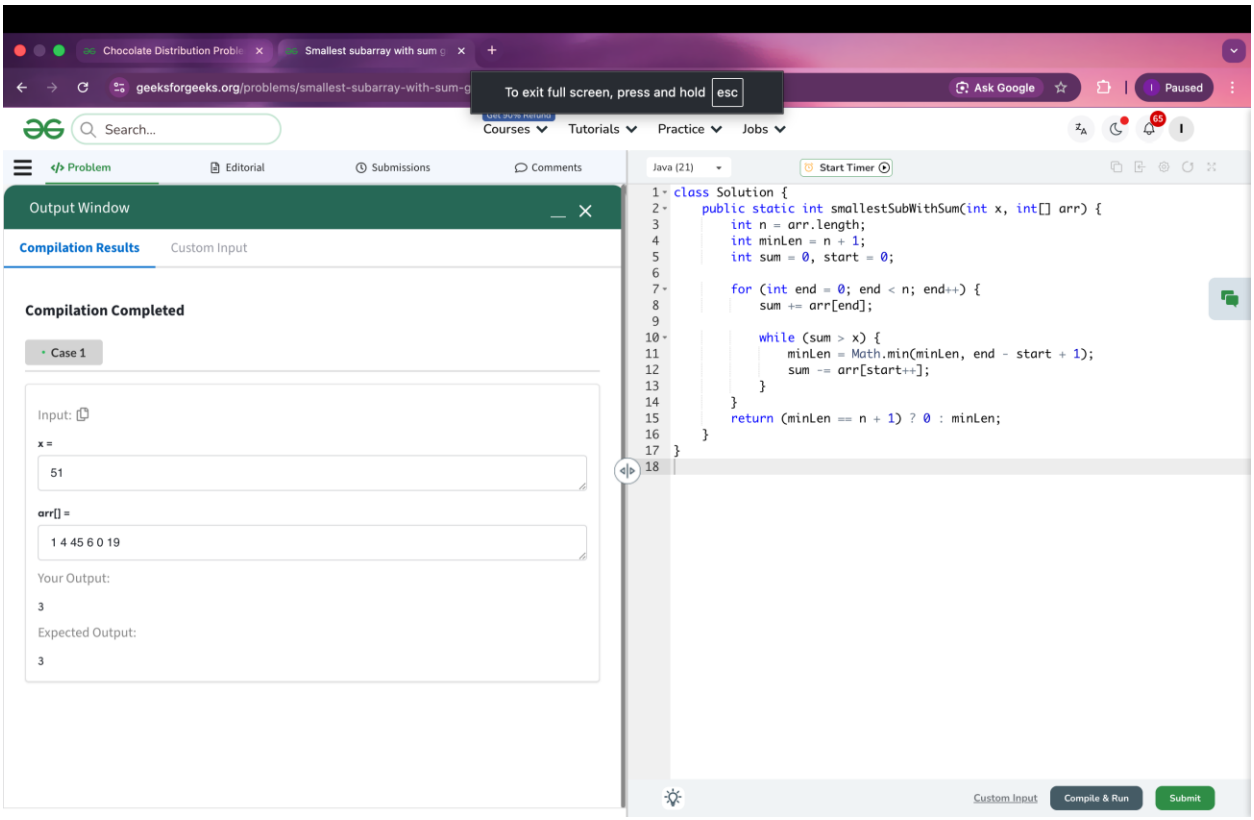
EXPERIMENT 2

Given a number x and an array of integers arr, find the smallest subarray with sum greater than the given value. If such a subarray do not exist return 0 in that case.

Examples:

Input: x = 51, arr[] = [1, 4, 45, 6, 0, 19]
Output: 3
Explanation: Minimum length subarray is [4, 45, 6]Input: x = 100, arr[] = [1, 10, 5, 2, 7]
Output: 0
Explanation: No subarray exist

Constraints:
1 ≤ arr.size, x ≤ 10^5
0 ≤ arr[] ≤ 10^4



EXPERIMENT 3

Given an array and a range a, b. The task is to partition the array around the range such that the array is divided into three parts.
1) All elements smaller than a come first.
2) All elements in range a to b come next.
3) All elements greater than b appear in the end.
The individual elements of three sets can appear in any order. You are required to return the modified array.

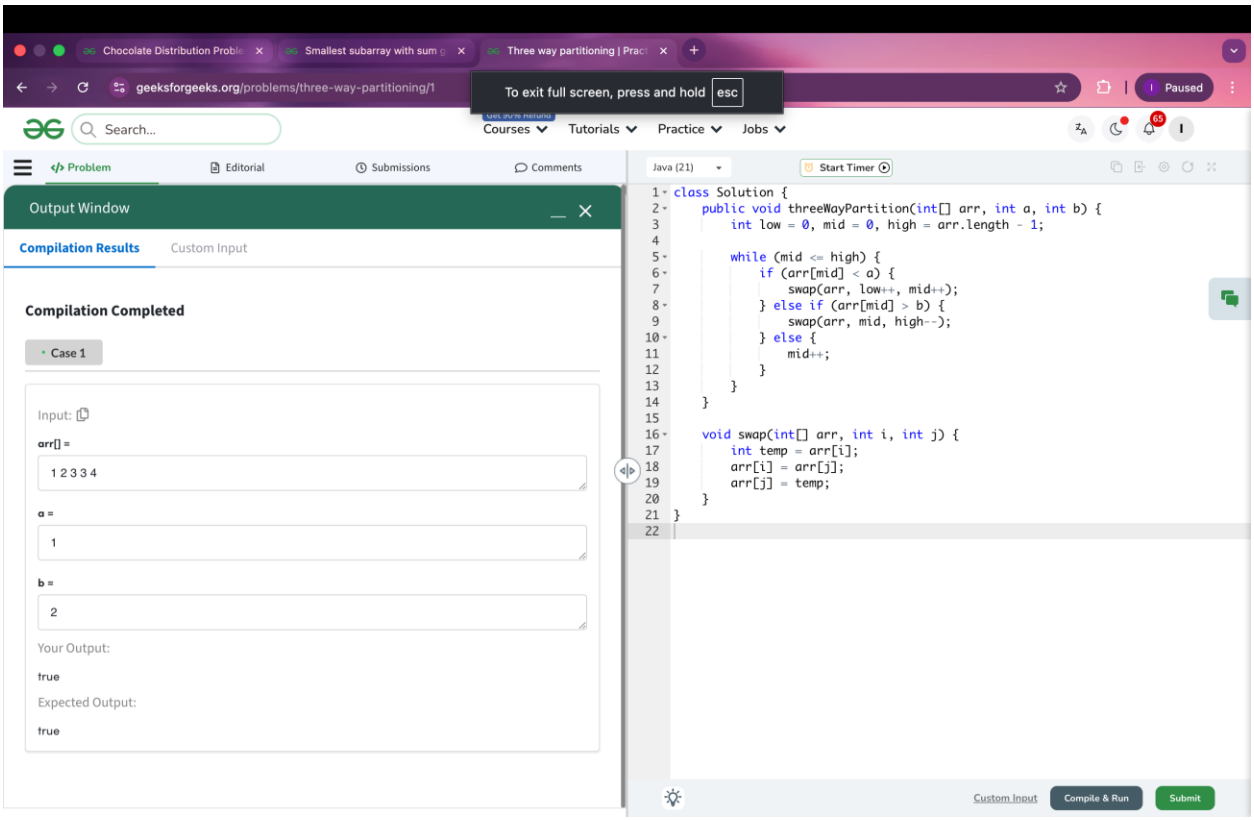
Note: The generated output is true if you modify the given array successfully. Otherwise false.

Geeky Challenge: Solve this problem in O(n) time complexity.

Examples:

Input: arr[] = [1, 2, 3, 3, 4], a = 1, b = 2
Output: true
Explanation: One possible arrangement is: {1, 2, 3, 3, 4}. If you return a valid arrangement, output will be true.
Input: arr[] = [1, 4, 3, 6, 2, 1], a = 1, b = 3
Output: true
Explanation: One possible arrangement is: {1, 3, 2, 1, 4, 6}. If you return a valid arrangement, output will be true.

Constraints:
1 <= arr.size()<= 10^6
1 <= array[i], a, b <= 10^9



EXPERIMENT 4

Given an array arr and a number k. One can apply a swap operation on the array any number of times, i.e choose any two index i and j (i < j) and swap arr[i] , arr[j] . Find the minimum number of swaps required to bring all the

numbers less than or equal to k together, i.e. make them a contiguous subarray.

Examples :

Input: arr[] = [2, 1, 5, 6, 3], k = 3

Output: 1

Explanation: To bring elements 2, 1, 3 together, swap index 2 with 4 (0-based indexing), i.e. element arr[2] = 5 with arr[4] = 3 such that final array will be- arr[] = [2, 1, 3, 6, 5]

Input: arr[] = [2, 7, 9, 5, 8, 7, 4], k = 6

Output: 2

Explanation: To bring elements 2, 5, 4 together, swap index 0 with 2 (0-based indexing) and index 4 with 6 (0-based indexing) such that final array will be- arr[] = [9, 7, 2, 5, 4, 7, 8]

Input: arr[] = [2, 4, 5, 3, 6, 1, 8], k = 6

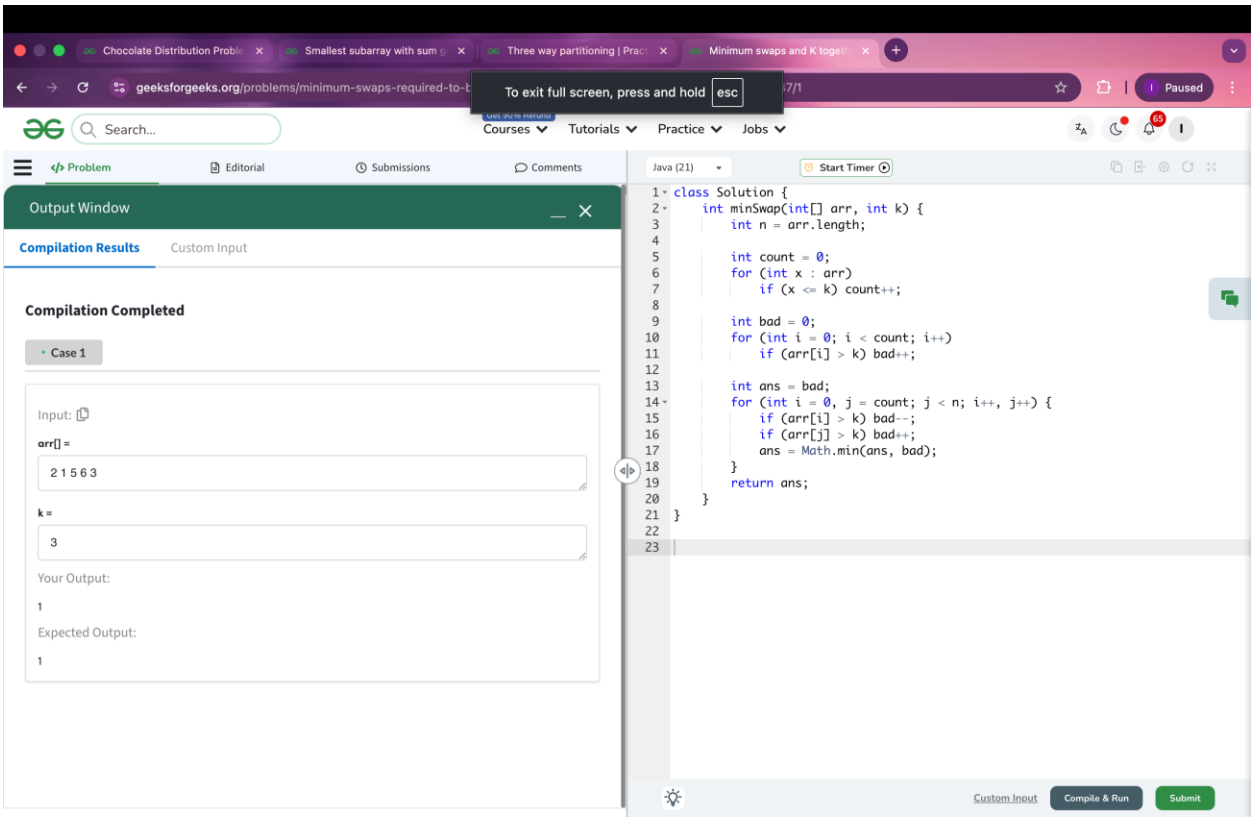
Output: 0

Constraints:

$1 \leq arr.size() \leq 10^6$

$1 \leq arr[i] \leq 10^6$

$1 \leq k \leq 10^6$



EXPERIMENT 5

Given an array arr[] of positive integers. Return true if all the array elements are palindrome otherwise, return false.

Examples:

Input: arr[] = [111, 222, 333, 444, 555]

Output: true

Explanation:

arr[0] = 111, which is a palindrome number.

arr[1] = 222, which is a palindrome number.

arr[2] = 333, which is a palindrome number.

arr[3] = 444, which is a palindrome number.

arr[4] = 555, which is a palindrome number.

As all numbers are palindrome so This will return true.Input: arr[] = [121, 131, 20]

Output: false

Explanation: 20 is not a palindrome hence the output is false.

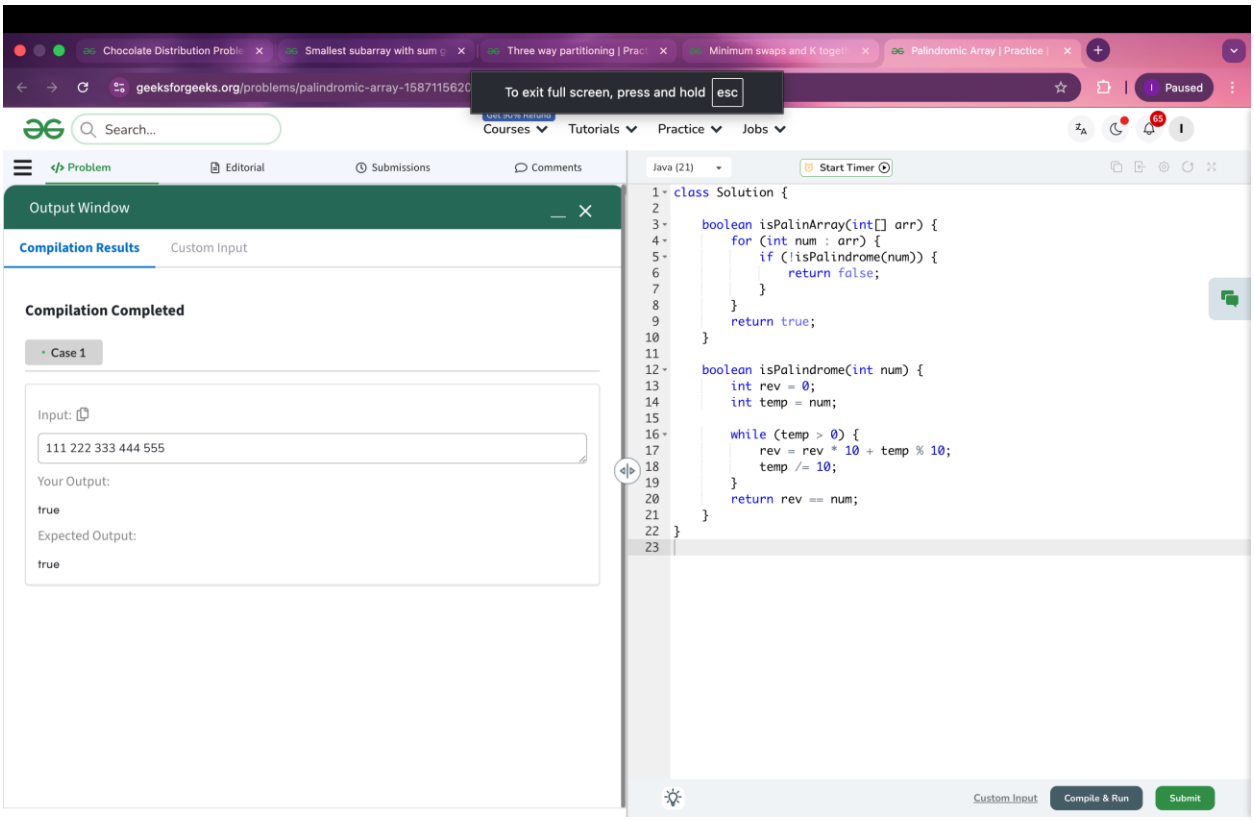
Expected Time Complexity: O(nlogn)

Expected Space Complexity: O(1)

Constraints:

1 <=arr.size<= 20

1 <=arr[i]<= 10^5



EXPERIMENT 6

Given an array arr[] of integers, calculate the median.

Examples:

Input: arr[] = [90, 100, 78, 89, 67]

Output: 89

Explanation: After sorting the array middle element is the median

Input: arr[] = [56, 67, 30, 79]

Output: 61.5

Explanation: In case of even number of elements, average of two middle elements is the median.

Input: arr[] = [1, 2]

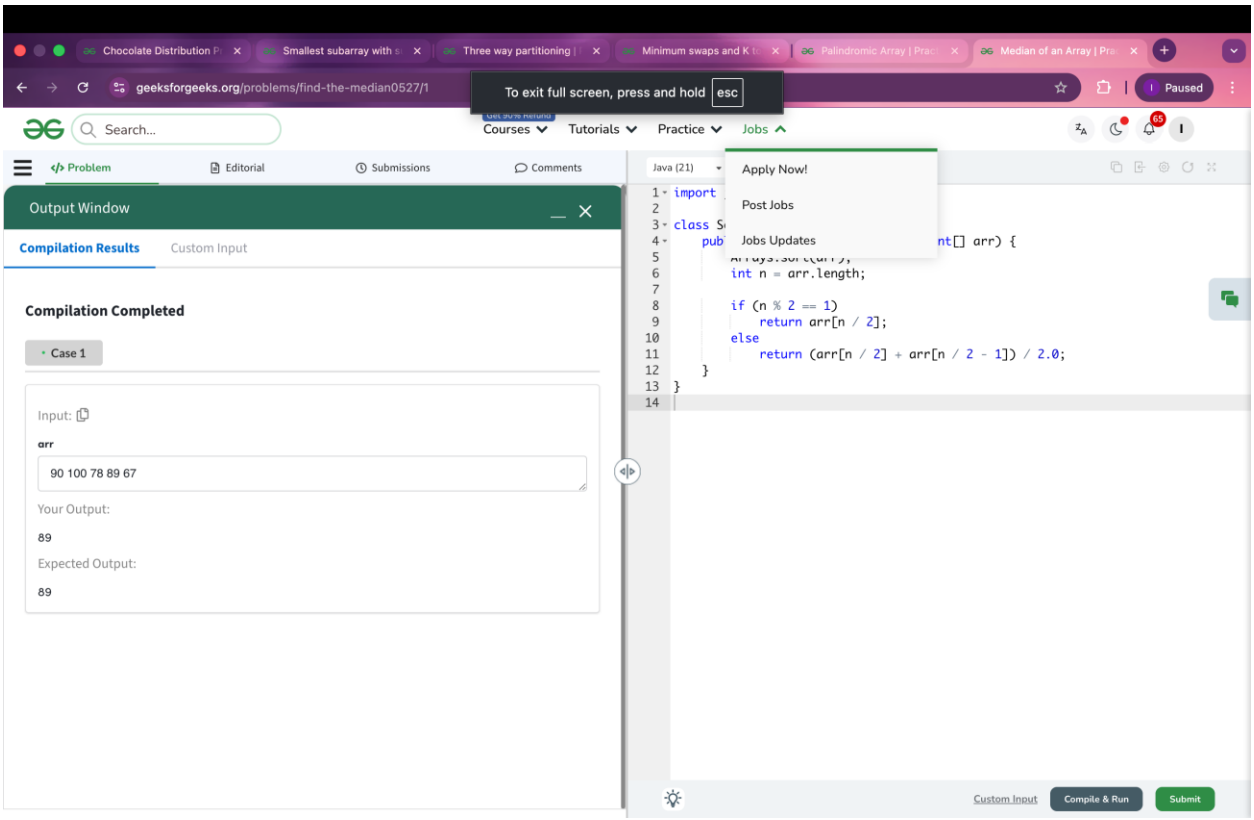
Output: 1.5

Explanation: The average of both elements will result in 1.5.

Constraints:

$1 <= arr.size() <= 10^5$

$1 <= arr[i] <= 10^5$



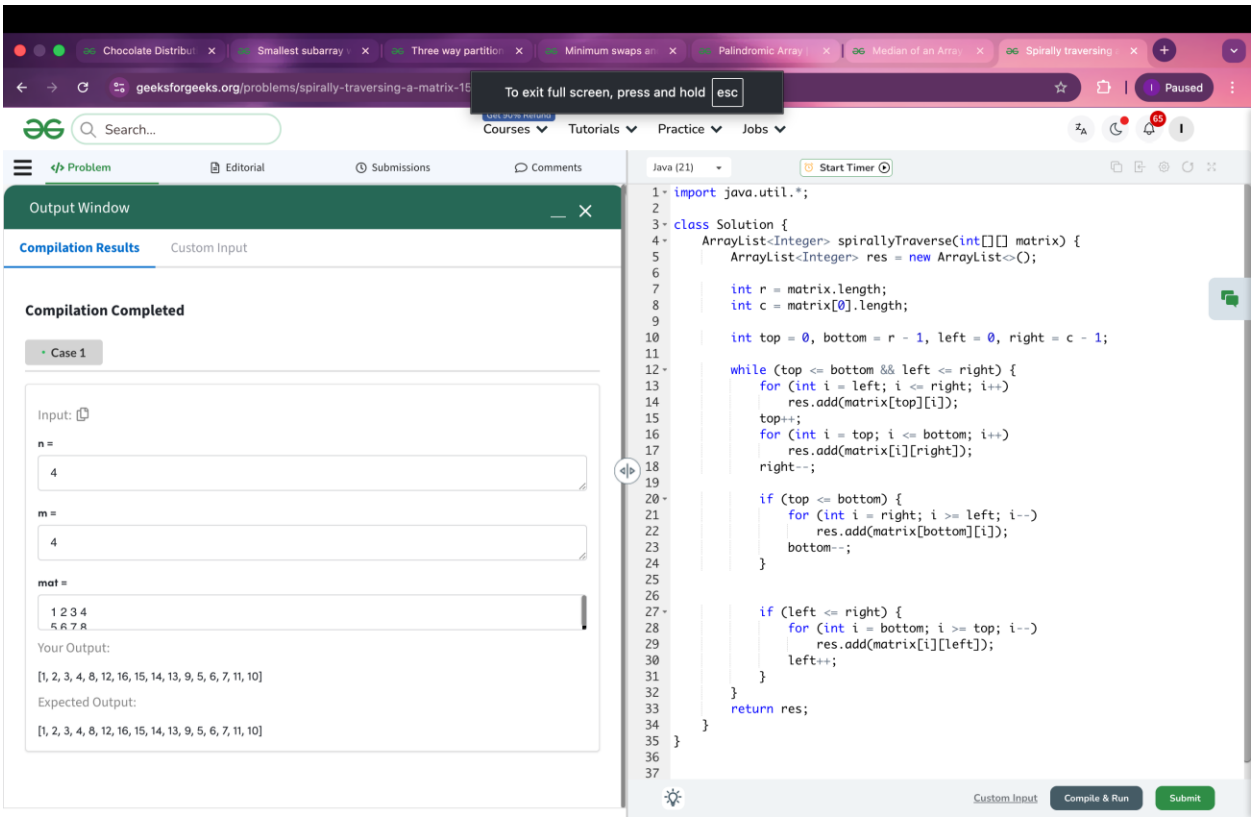
EXPERIMENT 7

You are given a rectangular matrix mat[][] of size n x m, and your task is to return an array while traversing the matrix in spiral form.

Examples:

Input: mat[][] = [[1, 2, 3, 4, 5, 6], [7, 8, 9, 10, 11, 12], [13, 14, 15, 16, 17, 18]]
Output: [1, 2, 3, 4, 5, 6, 12, 18, 17, 16, 15, 14, 13, 7, 8, 9, 10, 11]
Explanation: Applying same technique as shown above.Input: mat[][] = [[32, 44, 27, 23], [54, 28, 50, 62]]
Output: [32, 44, 27, 23, 62, 50, 28, 54]
Explanation: Applying same technique as shown above, output will be [32, 44, 27, 23, 62, 50, 28, 54].

Constraints:
1 ≤ n, m ≤1000
0 ≤ mat[i][j] ≤100



EXPERIMENT 8

You are given an m x n integer matrix matrix with the following two properties:

- Each row is sorted in non-decreasing order.
- The first integer of each row is greater than the last integer of the previous row.

Given an integer target, return true *if* target *is in* matrix *or* false *otherwise*.

You must write a solution in O(log(m * n)) time complexity.

Example 1:

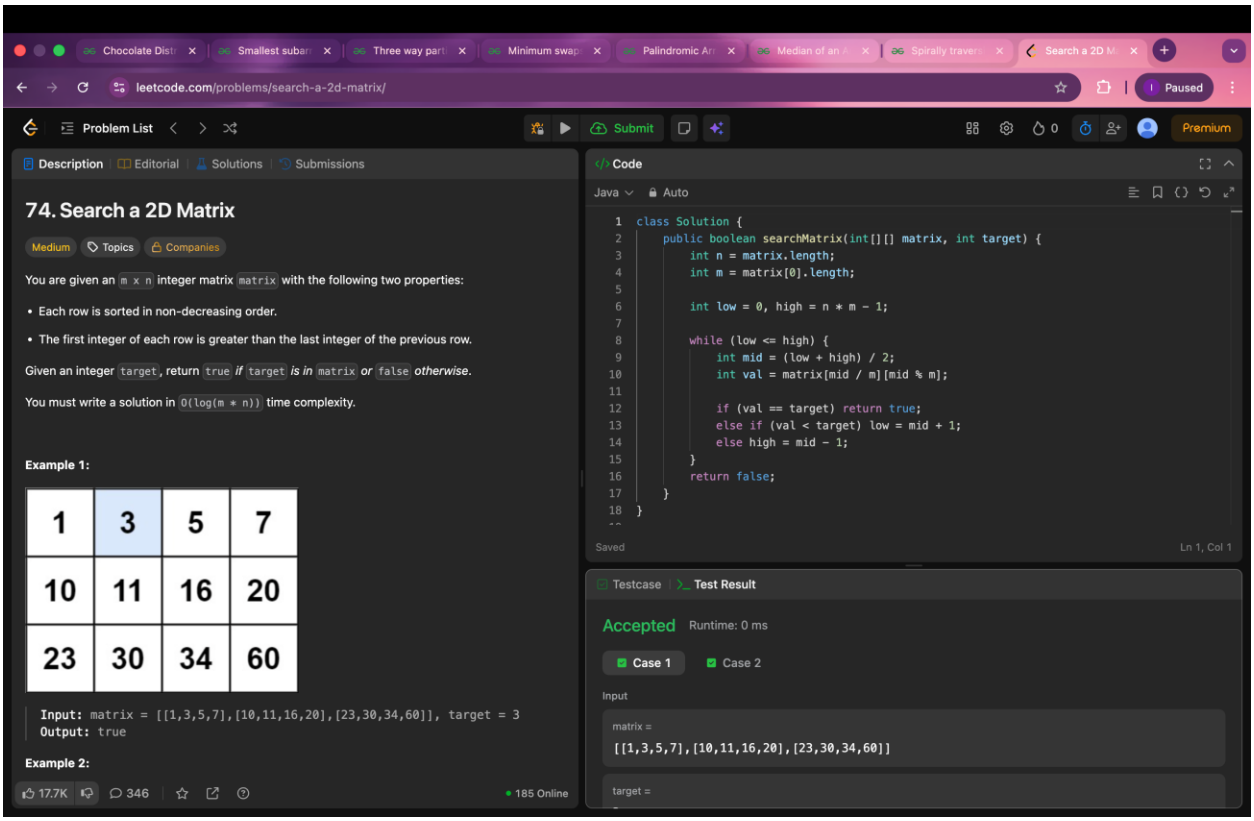
Input: matrix = [[1,3,5,7],[10,11,16,20],[23,30,34,60]], target = 3

Output: true

Example 2:

Input: matrix = [[1,3,5,7],[10,11,16,20],[23,30,34,60]], target = 13

Output: false



EXPERIMENT 9

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.

Examples:

Input: mat[][] = [[1, 3, 5],
[2, 6, 9],
[3, 6, 9]]

Output: 5

Explanation: Sorting matrix elements gives us [1, 2, 3, 3, 5, 6, 6, 9, 9]. Hence, 5 is median.

Input: mat[][] = [[2, 4, 9],
[3, 6, 7],
[4, 7, 10]]

Output: 6

Explanation: Sorting matrix elements gives us [2, 3, 4, 4, 6, 7, 7, 9, 10]. Hence, 6 is median.Input: mat = [[3], [4], [8]]

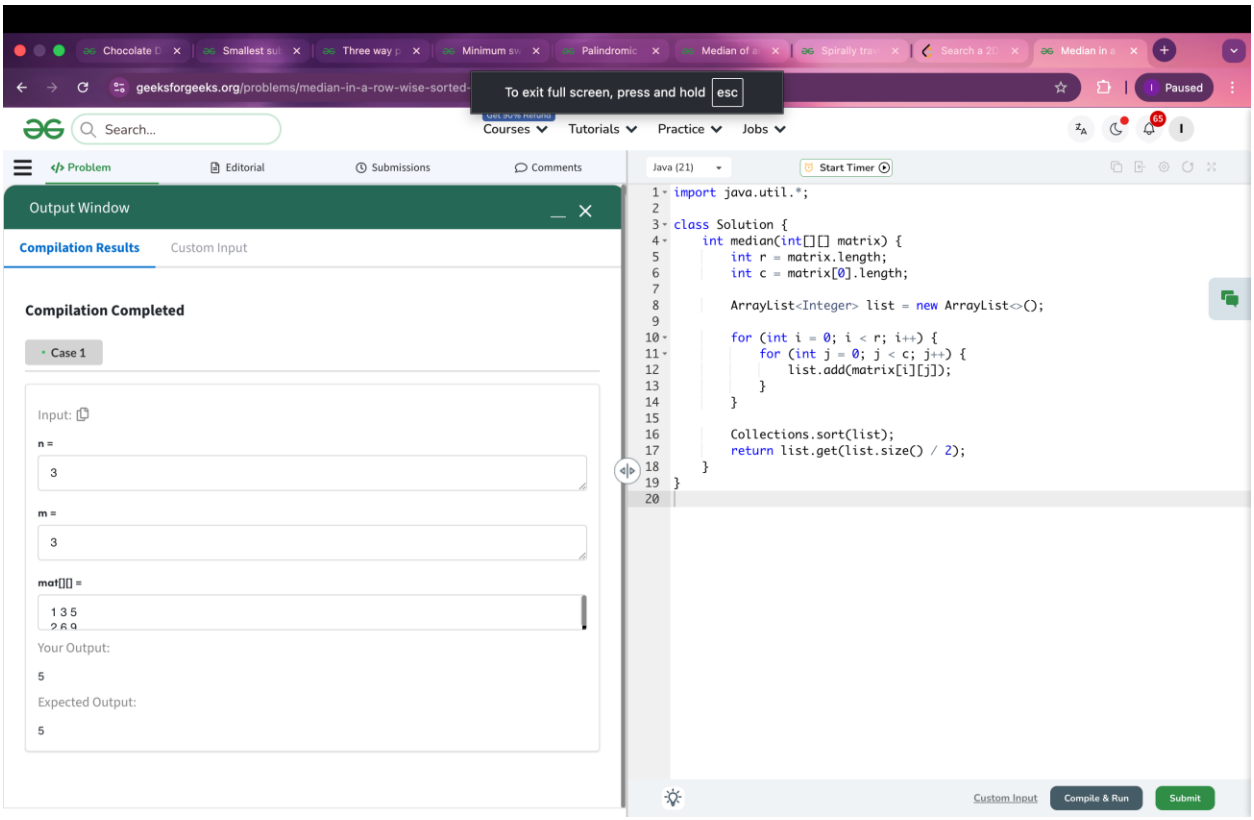
Output: 4

Explanation: Sorting matrix elements gives us [3, 4, 8]. Hence, 4 is median.

Constraints:

$1 \leq n, m \leq 400$

$1 \leq mat[i][j] \leq 2000$



EXPERIMENT 10

You are given a 2D binary array arr[][] consisting of only 1s and 0s. Each row of the array is sorted in non-decreasing order. Your task is to find and

return the index of the first row that contains the maximum number of 1s. If no such row exists, return -1.

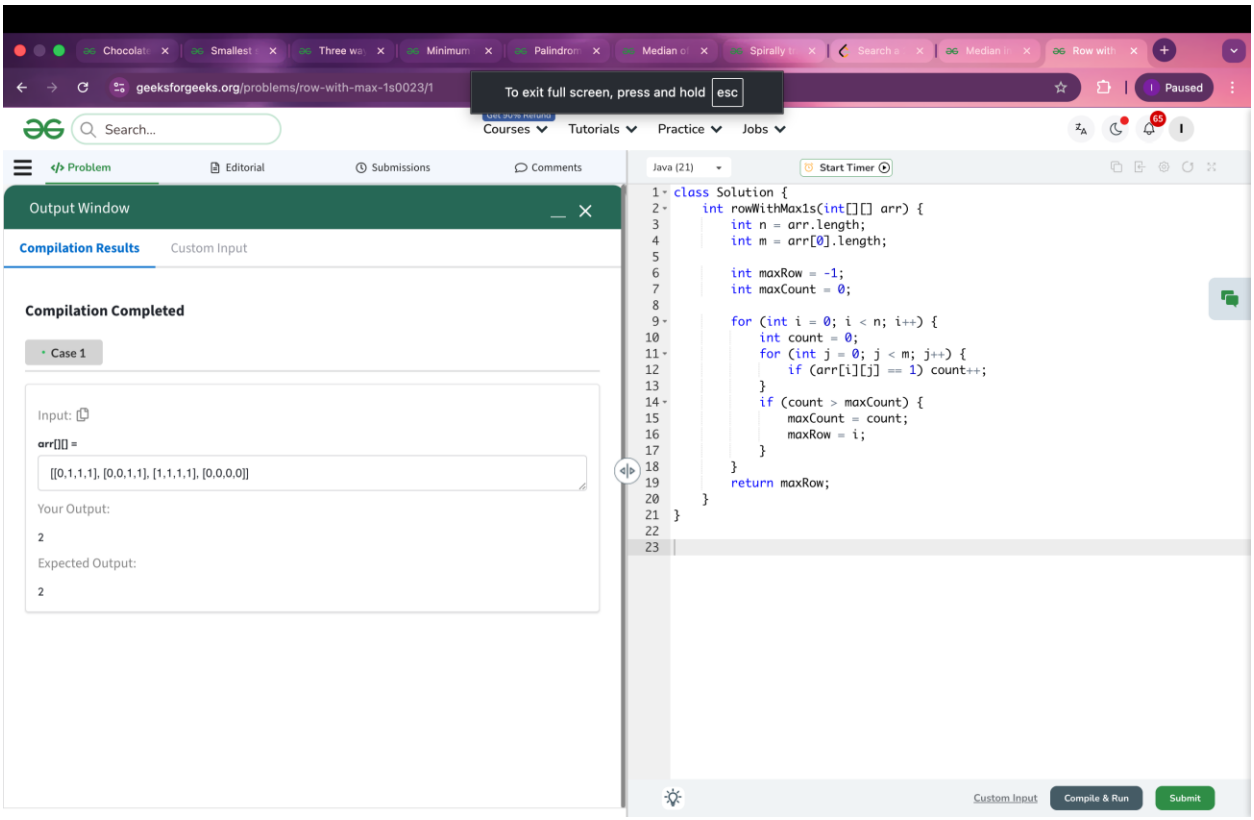
Note:

- The array follows 0-based indexing.
- The number of rows and columns in the array are denoted by n and m respectively.

Examples:

Input: arr[][] = [[0,1,1,1], [0,0,1,1], [1,1,1,1], [0,0,0,0]]
Output: 2
Explanation: Row 2 contains the most number of 1s (4 1s). Hence, the output is 2.Input: arr[][] = [[0,0], [1,1]]
Output: 1
Explanation: Row 1 contains the most number of 1s (2 1s). Hence, the output is 1.Input: arr[][] = [[0,0], [0,0]]
Output: -1
Explanation: No row contains any 1s, so the output is -1.

Constraints:
1 ≤ arr.size(), arr[i].size() ≤ 10^3
0 ≤ arr[i][j] ≤ 1


geeksforgeeks.org/problems/row-with-max-1s0023/1
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Case 1
Input:
arr[][] =
[[0,1,1,1], [0,0,1,1], [1,1,1,1], [0,0,0,0]]
Your Output:
2
Expected Output:
2
Java (21)
Start Timer
class Solution {
int rowWithMax1s(int[][] arr) {
int n = arr.length;
int m = arr[0].length;
int maxRow = -1;
int maxCount = 0;
for (int i = 0; i < n; i++) {
int count = 0;
for (int j = 0; j < m; j++) {
if (arr[i][j] == 1) count++;
}
if (count > maxCount) {
maxCount = count;
maxRow = i;
}
}
return maxRow;
}
}
Custom Input
Compile & Run
Submit