COMPETITIVE PROGRAMMING

ASSIGNMENT 1

Question 1

Maximum and Minimum Of Array Elements

Given an array **A[ ]**, find **maximum** and **minimum** elements from the array.

Input:

The first line of input contains an integer **T,** denoting the number of testcases. The description of T testcases follows. The first line of each testcase contains a single integer **N** denoting the size of array. The second line contains N space-separated integers **A1, A2, ..., AN** denoting the elements of the array.

Output:

For each testcase in a new line, print the maximum and minimum element in a single line with space in between.

Constraints:

$1 \leq T \leq 30$

$1 \leq N \leq 100$

$0 \leq A[i] < 100$

Example:

Input:

2

4

5 4 2 1

1

8

Output:

5 1

8 8

Question 2

Sum of array elements

Given an integer array **A** of size **N**, find sum of elements in it.

Input:
First line contains an integer denoting the test cases **'T'**. T testcases follow. Each testcase contains two lines of input. First line contains **N** the size of the array **A**. The second line contains the elements of the array.

Output:
For each testcase, print the sum of all elements of the array in separate line.

Constraints:
1 <= T <= 100

1 <= N <= 100

1 <= Ai <= 100

Example:
Input:
2

3

3 2 1

4

1 2 3 4

Output:
6

10

Question 3

Majority Element

Given an array **A** of **N** elements. Find the majority element in the array. A majority element in an array A of size N is an **element that appears more than N/2 times in the array**.

Input:
The first line of the input contains **T** denoting the number of testcases. The first line of the test case will be the size of array and second line will be the elements of the array.

Output:
For each test case the output will be the majority element of the array. Output "**-1**" if no majority element is there in the array.

Constraints:
1 <= T<= 100
1 <= N <= 107
0 <= Ai <= 106

Example:
Input:
2
5
3 1 3 3 2
3
1 2 3

Output:
3
-1

Question 4

Array Wave

Given a sorted array **arr[]** of non-repeating integers without duplicates. Sort the array into a wave-like array and return it. In other words, arrange the elements into a sequence such that a1 >= a2 <= a3 >= a4 <= a5..... (considering the increasing lexicographical order).

Input:
The first line contains an integer **T**, depicting total number of test cases. **T** testcases follow. The first line of each testcase contains an integer **N** depicting the size of the array. The second line contains N space separated elements of the array.

Output:
For each testcase, in a new line, print the array into wave-like array.

Constraints:
1 ≤ T ≤ 100
1 ≤ N ≤ 106
0 ≤ A[i] ≤107

Example:
Input:
1
5
1 2 3 4 5
Output:
2 1 4 3 5

Question 5

Leaders in an array

Given an array of positive integers. Your task is to find the leaders in the array.
Note: An element of array is leader if it is greater than or equal to all the elements to its right side. Also, the rightmost element is always a leader.

Input:
The first line of input contains an integer **T** denoting the number of test cases. The description of **T** test cases follows.
The first line of each test case contains a single integer **N** denoting the size of array.
The second line contains N space-separated integers A1, A2, ..., AN denoting the elements of the array.

Output:
Print all the leaders.

Constraints:
1 <= T <= 100
1 <= N <= 107
0 <= Ai <= 107

Example:
Input:
3
6
16 17 4 3 5 2
5
1 2 3 4 0
5
7 4 5 7 3
Output:
17 5 2
4 0
7 7 3

Question 6

Equilibrium Point :

Given an array **A** of **N** positive numbers. The task is to find the position where equilibrium first occurs in the array. Equilibrium position in an array is a position such that the sum of elements before it is equal to the sum of elements after it.

Input:
The first line of input contains an integer **T**, denoting the number of test cases. Then T test cases follow. First line of each test case contains an integer N denoting the size of the array. Then in the next line are N space separated values of the array A.

Output:
For each test case in a new line print the position at which the elements are at equilibrium if no equilibrium point exists print -1.

Constraints:
1 <= T <= 100
1 <= N <= 106
1 <= Ai <= 108

Example:
Input:
2
1
1
5
1 3 5 2 2

Output:
1
3

Question 7

Count Pairs in an Array

Given an array of integers arr[0..n-1], count all pairs (arr[i], arr[j]) in it such that i*arr[i] > j*arr[j], 0 =< i < j < n.

Example:

Input: arr[] = {5, 0, 10, 2, 4, 1, 6}

Output: 5

Explanation:

Pairs which hold condition i*arr[i] > j*arr[j] are

(10, 2) (10, 4) (10, 1) (2, 1) (4, 1)

Input:

The first line of input contains T denoting the no. of test cases . Then T test cases follow . The first line of each test case contains an Integer N and the next line contains N space separated values of the array A[ ] .

Output:

For each test case output the required result in a new line.

Constraints:

1<=T<=100

1<=N<=100

1<=A[ ] <=1000

Example:

Input:

2

7

5 0 10 2 4 1 6

4

8 4 2 1

Output:

5

Question 8

Find Transition Point

You are given a sorted array containing only numbers 0 and 1. Find the transition point efficiently. Transition point is a point where "0" ends and "1" begins.

Input:

You have to complete the method which takes 2 argument: the array arr[] and size of array N. You should not read any input from stdin/console. There are multiple test cases. For each test cases, this method will be called individually.

Output:

Your function should return transition point.

Constraints:

$1 \leq T \leq 100$

$1 \leq N \leq 500000$

$0 \leq C[i] \leq 1$

Example:

Input

1

5

0 0 0 1 1

Output

3

Question 9

First negative integer in every window of size k
Given an array and a positive integer k, find the first negative integer for each and every window(contiguous subarray) of size k.

Input:
The first line of input contains an integer T denoting the number of test cases. Then T test cases follow. Each test case contains an integer n denoting the size of the array. The next line contains n space separated integers forming the array. The last line contains the window size k.

Output:
Print the space separated negative integer starting from the first till the end for every window size k. If a window does not contain a negative integer , then print 0 for that window.

Constraints:
1<=T<=10^5
1<=n<=10^5
1<=a[i]<=10^5
1<=k<=n
Example:
Input:
2
5
-8 2 3 -6 10
2
8
12 -1 -7 8 -15 30 16 28
3

Output:
-8 0 -6 -6
-1 -1 -7 -15 -15 0

Question 10

Addition of submatrix

Given a matrix **C** of size **N** x **M**. You are given position of submatrix as X_1, Y_1 and X_2, Y_2 inside the matrix. Find the sum of all elements inside that submatrix.

Input:

The first line of input contains an integer T denoting the number of test cases. The first line of each test case is n and m,n is the number of rows and m is the number of columns. The second line of each test case contains C[N][M]. The third line contains four value of X_1, Y_1, X_2, Y_2. X_1, Y_1 is the top left cell and X_2, Y_2 is the bottom right cell.

Output:

Print the sum of all elements inside that submatrix.

Constraints:

$1 \leq T \leq 15$

$1 \leq N, M \leq 10^3$

$1 \leq C[N][M] \leq 10^6$

$1 <= X_1, Y_1, X_2, Y_2 <= M$

Example:

Input:

2
5 6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3 4 4 5
3 3
9 8 7 4 2 1 6 5 3
1 2 3 3

Output:

78

26

Question 11

Kth smallest element

Given an array **arr[]** and a number **K** where K is smaller than size of array, the task is to find the **K^{th} smallest** element in the given array. It is given that all array elements are distinct.
Expected Time Complexity: O(n)
Input:
The first line of input contains an integer **T,** denoting the number of testcases. Then T test cases follow. Each test case consists of three lines. First line of each testcase contains an integer **N** denoting size of the array. Second line contains N space separated integer denoting elements of the array. Third line of the test case contains an integer K.
Output:
Corresponding to each test case, print the k^{th} smallest element in a new line.
Constraints:
1 <= T <= 100
1 <= N <= 10^5
1 <= arr[i] <= 10^5
1 <= K <= N
Example:
Input:
2
6
7 10 4 3 20 15
3
5
7 10 4 20 15
4
Output:
7
15

Question 12

Largest Fibonacci Subsequence

Given an array with positive number the task to find the largest subsequence from array that contain elements which are Fibonacci numbers.

Input:

The first line of input contains an integer T denoting the no of test cases. Then T test cases follow. Each test case contains an integer N denoting the size of the array. Then in the next line are N space separated values of the array.

Output:

For each test case in a new line print the space separated elements of the longest fibonacci subsequence.

Constraints:

1<=T<=100
1<=N<=100
1<=A[]<=1000

Example:

Input:

2
7
1 4 3 9 10 13 7
9
0 2 8 5 2 1 4 13 23

Output:

1 3 13
0 2 8 5 2 1 13

Question 13

Matrix Interchange

Working with 2D arrays is quite important. Here we will do swapping of columns in a 2D array. You are given a **matrix M of r rows and c columns**. You need to **swap the first column with the last column**.

Input Format:

The first line of input contains **T**, the number of testcases. T testcases follow. Each testcase contains two lines of input. The first line contains r and c, separated by a space. The next r lines contains c elements of the matrix, separated by spaces.

Output Format:

For each testcase, in a new line, print the modified matrix.

Your Task:

Since this is a function problem, you don't need to take any input. Just complete the provided function **interchange(int , int)** that take rows and columns number as parameter.

Constraints:

1 <= T <= 100

1 <= r,c <= 100

Example:

Input:

1

3 4

1 2 3 4

4 3 2 1

6 7 8 9

Output:

4 2 3 1

1 3 2 4

9 7 8 6

Question 14

Count Occurences of Anagrams

Given a word S and a text C. Return the count of the occurences of anagrams of the word in the text.

Input:

The first line of input contains an integer T denoting the number of test cases. The description of T test cases follows. The first line of each test case contains a text S consisting of only lowercase characters.

The second line contains a word consisting of only lowercase characters.

Output:

Print the count of the occurences of anagrams of the word C in the text S.

Constraints:

1 <= T <= 50

1 <= |S| <= |C| <= 50

Example:

Input:

2

forxxorfxdofr

for

aabaabaa

aaba

Output:

3

4

Question 15

Min sum formed by digits

Given an array of digits (values are from 0 to 9), find the minimum possible sum of two numbers formed from digits of the array. All digits of given array must be used to form the two numbers.

Input:

The first line of input contains an integer T denoting the number of test cases. Then T test cases follow. First line of each test case contains an integer N denoting the size of the array. Next line of each test contains N space seperated integers denoting the elements of the array.

Output:

For each test case output a single line containing the required sum.

Constraints:

1<=T<=100

1<=N<=50

Example:

Input

2

6

6 8 4 5 2 3

5

5 3 0 7 4

Output

604

82