University of Chittagong

Engineering Day Programming Contest 2022

Dedicated to the red building

Prepared by **Department of Computer Science and Engineering, University of Chittagong**

A. Programmer's Engineering Day!!!

Time limit: 1 second
Memory limit: 512 megabytes

Finally, the engineering day has come! Everybody is super excited about this day! Like everybody, we programmers are also excited about this day! But we want to welcome this in our own style!

So let's print "Welcome To The Engineering Day 2022!!!" without quotation and welcome our beloved Engineering Day!

Input
There is no input for this problem.

Output
Output as stated in the description.

Problem Setter: *Omar Faruque, 15th batch, CSE, University of Chittagong*

B. Longest Subarray

Time Limit: 2 second
Memory Limit: 512 MB

You are given an array ***A*** of ***N*** integers. Find the length of the longest subarray such that the sum of all the elements of the chosen subarray does not exceed ***S***.

An array ***Y*** is a subarray of an array ***X*** if ***Y*** can be obtained from ***X*** by deletion of several (possibly, zero or all) elements from the beginning and several (possibly, zero or all) elements from the end. In particular, an array is a subarray of itself.

Input
The first line contains an integer number T $(1 \le T \le 10)$
The first line of each test case contains two integers N and S $(1 \le N \le 2 \cdot 10^5; 1 \le S \le 10^{18})$
The second line of each test case contains N integers $A_1, A_2 \ldots, A_n$ $(1 \le A_i \le 10^9)$

Output
For each test case, print the length of the longest subarray in a separate line.

Sample Input
```
2
5 11
15 6 5 12 1
5 12
9 17 2 15 5
```

Sample Output
```
2
1
```

Problem Setter: *Ahasanul Kader Chowdhury, 17th batch, CSE, University of Chittagong*
Alternate Solution Writer: *Muhammad Shahriar Alam, 17th batch, CSE, University of Chittagong*

C. Word Game

Time Limit: 1 second
Memory Limit: 512 MB

Lemon gave two words to Orange $\mathbf{w_1}$ and $\mathbf{w_2}$. Orange has to make $\mathbf{w_2}$ from the letters of $\mathbf{w_1}$. Orange is allowed to do one or more of the following operations to $\mathbf{w_1}$:

1. Rearrange the letters
2. Remove one or more letters
3. Change at most **k** amount of letters in $\mathbf{w_1}$ to any letter she wants

Suppose $\mathbf{w_1}$ = 'abcde', $\mathbf{w_2}$ = 'bcc' and **k** = 2. In this scenario, Orange can change the 1st letter of $\mathbf{w_1}$, 'a' to 'c'. After that, she will be able to make "bcc" from "**cbc**de"

You have to decide whether Orange will be able to make $\mathbf{w_2}$ by following the described way.

Input:
The first line of input contains an integer **T** ($1 \leq \mathbf{T} \leq 100$) —the number of test cases. The next **T** line will contain one integer **k** ($1 \leq \mathbf{k} \leq |\mathbf{w_1}|$) and two words $\mathbf{w_1}$, $\mathbf{w_2}$ where ($1 \leq |\mathbf{w_1}, \mathbf{w_2}| \leq 1000$). The words $\mathbf{w_1}$ and $\mathbf{w_2}$ will contain lowercase English alphabets.

Output:
For each test case, print "YES" if it is possible to make $\mathbf{w_2}$, otherwise print "NO" (excluding the quotation marks).

Sample Input:
3
1 orange lemon
3 orange lemon
5 lemon orange

Sample Output:
NO
YES
NO

Problem Setter: *Asma Ul Husna Chowdhury, 15 batch, CSE, University of Chittagong*
& Gazi Mohaimin Iqbal, 17 batch, CSE, University of Chittagong
Alternate Solution Writer: *Gazi Mohaimin Iqbal, 17 batch, CSE, University of Chittagong*

D. Shopping Time

Time Limit: 1 second
Memory Limit: 512 MB

Meena and Raju participated in a contest. They got frustrated after that contest as they couldn't perform as expected. So Meena and Raju planned to go shopping with their classmates to change their mood.

There are some traditions their classmates follow when they go shopping together:

- Any person **X** can ask for any amount of money **M** from any other person **Y**.
    - If **X** and **Y** are friendly with each other and **Y** has strictly more money than **M**, **Y** will give the money to **X**.
    - If **X** and **Y** are not friendly or **Y** doesn't have enough money, **Y** will not give the money at all.

- A person **P** can wish to spend any amount of money **W.**
    - If **P** has **W** amount of money or more, s/he will immediately spend that to fulfill his/her wish,
    - If **P** doesn't have enough money, he will give up his/her wish immediately.

Initially everybody has some money with them. During shopping they might get some money from some friends or friendly people, and spend money for shopping. The description will be given to you. You need to calculate how much money everybody would have after returning from the shopping mall.

Note: X and Y will be friendly if they belong to the same friend group. Let's say, there are friendships between A-B, B-C, C-D. Then A will be friendly to C and D as well and A, B, C, D will be in the same friend group.

Input:
The first line will contain two integers **N** and **F** ($2 \leq \mathbf{N} \leq 10000$, $1 \leq \mathbf{F} \leq 10000$) —the number of classmates and the number of friendships respectively.

The second line will contain **N** integers m_1, m_2, m_3, …., m_n ($0 \leq m_i \leq 1000$) where m_i represents the initial amount of money of i^{th} classmate.

Each of the following **F** lines contains 2 integers **A** and **B** ($1 \leq \mathbf{A}, \mathbf{B} \leq \mathbf{N}$). It represents that there is a friendship between A and B.

The next line will contain one integer **E** ($0 \leq \mathbf{E} \leq 10\text{^}6$) — the number of events in shopping time.

Each of the following **E** lines will contain the description of an event. The description will begin with one integer **t**, event type:

- If **t** = 1, it is the event of asking money from another person. In that case, t will be followed by 3 integers **X**, **Y** and **M** ($1 \leq \mathbf{M} \leq 1000$) — the person who is asking money, the person from whom **X** is asking money, the amount of money respectively.
- If **t** = 2, it is a wish of spending money. In that case, t will be followed by 2 integers **P** — the person who is making a wish, **W** ($1 \leq \mathbf{W} \leq 1000$) — the amount of money **P** wants to spend.

Output:
You need to print n integers $m_1, m_2, m_3, \ldots, m_n$ where m_i represents how much money i^{th} person has after shopping. Don't print space after the last integer m_n (applicable for each line).

Sample Input:
5 4
5 10 45 32 15
1 3
3 2
4 5
2 1
5
1 2 3 5
1 2 4 5
2 3 30
1 2 3 15
2 2 10

Sample Output:
5 5 10 32 15

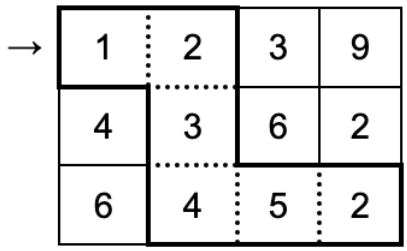
Problem Setter: *Asma Ul Husna Chowdhury, 15 batch, CSE, University of Chittagong*
Alternate Solution Writer: *Shakib Chowdhury, 15 batch, CSE, University of Chittagong*

E. Minimum Cost

Time limit: 2 second
Memory limit: 512 megabytes

You are given a *2D* grid W where W_{ij} represents an integer from the j^{th} cell of the i^{th} row. Initially, you are on the top left corner of the grid which is $[0, 0]$. You have to go to the bottom right corner of the grid which is $[N - 1, M - 1]$, where N, M represents the number of rows and columns of the grid respectively. From a cell, in one move, you can go either to it's immediate right cell or the cell below to it, *e.g. from the cell* $[2, 3]$, *you can go to* $[2, 4]$ *or* $[3, 3]$ *but not to any other cell*.

A path in the grid consists of the cells it goes through where the cost of a path is the largest number present on that path, *e.g. for the following grid, the cost of the path 1 → 2 → 3 → 4 → 5 → 2 is 5.*



Now, you have to find a path from your initial position to the destination which cost is minimum.

Input
The first line of the input contains the number of test cases T ($1 \le T \le 10$)
Next, each test case contains two integers N, M, where $1 \le N \le 10^5$, $1 \le M \le 10^5$ and $N * M \le 10^5$
Next, there will be N lines each having M integers W_{ij} , where $1 \le W_{ij} \le 10^9$

Output
For each test case, print the minimum possible cost to reach the destination in a separate line.

Sample Input
2
3 4
1 2 3 9
4 3 6 2
6 4 5 2
1 2
1 2

Sample Output

5
2

Problem Setter: *Omar Faruque, 15th batch, CSE, University of Chittagong*
Alternate Solution Writer: *Md Rashedul Alam Anik, 17th batch, CSE, University of Chittagong*

F. The Sum Shall Not Be Large

Time Limit: 2 second
Memory Limit: 512 MB

You are given an array of positive integers a of size n. You need to pick an integer x such that the summation of the absolute differences of x and $a[i]$ is minimum, where $1 \leq i \leq n$. Mathematically $\sum|x - a[i]| \ (1 \leq i \leq n)$ should be minimum. You can pick any x which results in the minimum summation. For each case, print the minimum summation.

For example, let $n = 4 \ and \ a = [1, 11, 12, 2]$ you can pick $x = 6$ and the summation is $|6 - 1| + |6 - 11| + |6 - 12| + |6 - 2| = 20$ which is the minimum possible summation.

Input
The first line of the input contains number of test cases $t \ (1 \leq t \leq 10)$.

The first line of each test case contains an integer $n \ (1 \leq n \leq 10^5)$, the size of the array. The next line contains n positive integers $a_1, a_2, \ldots, a_n \ (1 \leq a_i \leq 10^9)$.

Output
For each case, print the minimum possible summation for the array in a separate line.

Sample Input
2
4
1 11 12 2
2
1 2

Sample Output
20
1

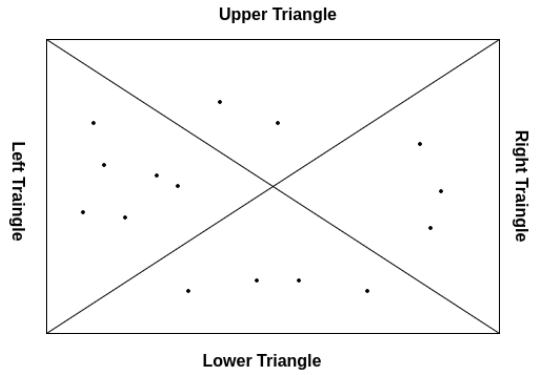
Problem Setter: *Abdullah Al Shaad, 16th batch, CSE, University of Chittagong*
Alternate Solution Writer1: *Shakib Chowdhury, 15th batch, CSE, University of Chittagong*
Alternate Solution Writer2: *Meehan, 15th batch, CSE, University of Chittagong*

G. CSE CU Premier League 2022

Time Limit : 1 second
Memory Limit: 512 MB

CSE CU Premier League 2022 has been a great tournament. The players showed a beautiful football display and the fans enjoyed it a lot. Every team played their hearts out and some teams had better results than others. Ahasun, Anik, Mohaimin and Shahriar were discussing the results and as football enthusiasts they were wondering if good results correlates with the positions players touch the ball in the field. You are going to help them.

The football field can be considered as a rectangle which can be divided into four triangles by drawing two diagonals. We can name the triangles as the left triangle, upper triangle, right triangle and lower triangle. And the position players touch the ball given as a point on the rectangle. You are going to calculate the count of ball touches in each of the triangles.



You will be given lower left (x_1, y_1) and upper right (x_2, y_2) coordinates of the rectangle. And then n points (x, y) where the players touch the ball. You have to count the number of points in each triangle. You can assume the rectangle will always be axis parallel. Also no points are on the border or on the diagonal of the rectangle or outside the rectangle.

Input

The first line of the input contains the number of test cases t ($1 \leq t \leq 10$)

For each test case, the first line contains four integers x_1, y_1, x_2, y_2 ($0 \leq x_1, y_1, x_2, y_2 \leq 10^5$) where (x_1, y_1) is the lower left coordinate and (x_2, y_2) is the upper right coordinate of the rectangle.

The next line contains an integer n ($1 \leq n \leq 1000$).

Then n lines follow. Each line contains two integer x, y ($1 \leq x, y \leq 10^5$), the position where the players touch the ball.

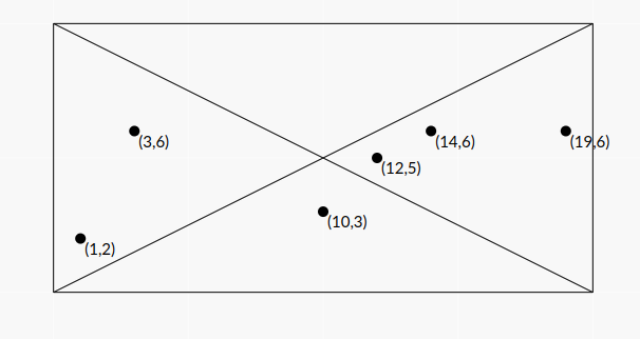
Output
For each case, print 4 integers, count of the points in the Left Triangle, Upper Triangle, Right Triangle and Lower Triangle **in order** separated by a space. Don't print space after the last integer of each line.

Sample Input
1
0 0 20 10
6
3 6
10 3
12 5
14 6
1 2
19 6

Sample Output
2 0 3 1

Explanation

The visualization of the sample test case is given below.



Problem Setter: *Abdullah Al Shaad, 16th batch, CSE, University of Chittagong*
& Tasdidur Rahman, CSE, SUST
Alternate Solution Writer: *Asma Ul Husna Chowdhury, 15th batch, CSE, University of Chittagong*

H. Who is the Best?

Time Limit: 1 second
Memory Limit: 512 MB

We all know about the two engineering departments present in our faculty - CSE and EEE. In a few days, they are going to participate in a programming contest organized by the Engineering day 2022 Authority. But because of their history of pride, both departments want to win the contest. And the rule of winning is **the more teams from a department participate in the contest, the more chances increase for them to win**.

So, you are given the number of teams from the CSE & EEE department.
You need to print the winning department's name, “CSE” or “EEE” depending on their chances to win. If both departments have an equal chance, print the text “Engineering Day 2022!” only.

Input:
The first line will contain one integer **T** ($1 \leq \mathbf{T} \leq 10000$) —the number of test cases.

Each of the following T lines will contain two integers **E** ($0 \leq \mathbf{E} \leq 100$) and **C** ($0 \leq \mathbf{C} \leq 100$) —the number of EEE teams and CSE teams respectively.

Output:
Print the phrase according to the problem statement.

Sample Input:
5
10 14
2 3
20 15
22 19
5 5

Sample Output:
CSE
CSE
EEE
EEE
Engineering Day 2022!

Problem Setter: *Asma Ul Husna Chowdhury, 15 batch, CSE, University of Chittagong*
Alternate Solution Writer: *Md Rashedul Alam Anik, 17th batch, CSE, University of Chittagong*

I. Palindrome Game

Time Limit : 1 second
Memory Limit : 512 MB

People of Jobraland follows DDMMYYYYYY format for calendar date, where DD stands for Day, MM for Month and YYYYYY for 6 digits long Year. Also, there are **12 months** in the Jobraland Calendar year like ours. But, each month consists of **30 days**. So, February also has 30 days.

You can call a date **Palindrome** if it's DDMMYYYYYY format string can be read the same way backward and forward. For example, 22 Feb 2022 is a palindrome date. You can write this one as 2202002022 **(If the year is not 6 digits long, then add '0' to its left side to make it 6 digits long. Same goes for month and day. Both will be 2 digits long)**. But, 2 Feb 2022 is not a palindrome. As it's DDMMYYYYYY format is 0202002022.

$22\ Feb\ 2022 \rightarrow 22/02/002022 \rightarrow 2202002022$, A palindrome
$2\ Feb\ 2022 \rightarrow 02/02/002022 \rightarrow 0202002022$, Not a palindrome
$30\ Feb\ 2003 \rightarrow 30/02/002003 \rightarrow 3002002003$, A palindrome

Given two years **S** and **E.** Can you print the number of dates which are palindromes between the given Jobraland Calendar years?

Input
The first line contains a single integer **T** $(1 \leq T \leq 10000)$ - the number of test cases.

Then, each of the next T lines contains two integers, **S** and **E** where $(1 \leq S \leq E \leq 999999)$.

Output
For each test case, print a single integer, number of palindrome dates present between the given years.

Sample Input
2
2022 2022
2021 2022

Sample Output
1
2

Problem Setter: *Shakib Chowdhury, 15th batch, CSE, University of Chittagong*
Alternate Solution Writer1: *Abdullah Al Noman, 15th batch, CSE, University of Chittagong*
Alternate Solution Writer2: *Abdullah Al Shaad, 16th batch, CSE, University of Chittagong*

J. Not in the List

Time Limit: 4s
Memory Limit: 512 MB

Given an array $a_1, a_2, ..., a_n$ consisting of n integers, find the maximum number x in the range $[-10^{18}, 10^{18}]$, such that, x **is not included** in the array, a.

Input

The first line in the input contains T ($1 \leq T \leq 10^5$), the number of test cases. The first line of each test case contains a positive integer n ($1 \leq n \leq 10^6$), the number of elements in the array. The second line contains n space-separated integers $a_1, a_2, ..., a_n$ ($-10^{18} \leq a_i \leq 10^{18}$), the elements of the array, a.

It is guaranteed that, **the sum of n over all test cases doesn't exceed** 10^6.

Output

Print the maximum value x ($-10^{18} \leq x \leq 10^{18}$), which is not included in the array, a.

Sample Input

```
2
5
1 2 3 4 5
2
2 1000000000000000000
```

Sample Output

```
1000000000000000000
999999999999999999
```

Problem Setter: *Md Rashedul Alam Anik, 17th batch, CSE, University of Chittagong*
Alternate Solution Writer: *Ahasanul Kader Chy, 17th batch, CSE, University of Chittagong*