A. Game

1 second, 256 megabytes

Alaa played a game and scored A points. She remembers winning the game by just one point.

Can you print the opponent's score?

Input
One integer number A $(1 \leq A \leq 100)$

Output
Print the opponent's score

input
9
output
8

input
100
output
99

B. Parking Impossible

1 second, 256 megabytes

Alice intends to drive to the market today and is seeking a secure parking spot to ensure the safety of her car from potential damage caused by Bob. The parking lot comprises available spaces numbered from N to M, inclusive. Bob, with malicious intent, will select two numbers, $X1$ and $X2$, to identify a location that can potentially harm any car parked there. Specifically, a parking space is deemed unsafe if its number divides both of Bob's chosen numbers. Your objective is to determine the count of safe parking spaces available for Alice.

Input
The first line of the input contains a single integer T $(1 \leq T \leq 10)$ the number of test cases.

The input segment will consist of four integers: N, M, $X1$, and $X2$. N represents the initial number of available parking spaces, M denotes the final number of available parking spaces, while $X1$ and $X2$ symbolize the two numbers that Bob chooses.

$1 \leq N \leq M \leq 10,000,000$

$1 \leq X1, X2 \leq 10,000,000$

Output
For each test case compute and provide the count of safe parking spaces for Alice to utilize.

input
2 1 10 2 3 7 7 15 12
output
9 1

In the first test case the unsafe parking space is the parking space with number 1 because both 2 and 3 are divisible by 1.

C. Count Binaries

1 second, 256 megabytes

Given a string S consisting of '0's and '1's. Count the number of substrings that contain only '1's.

A string a is a substring of a string b if a can be obtained from b by the deletion of several (possibly, zero or all) characters from the beginning and several (possibly, zero or all) characters from the end.

For simplicity, a substring of S is a contiguous part of string S (i.e. $S_i, S_{i+1}, \ldots, S_j$ for some $1 \leq i \leq j \leq |S|$).

Input

The first line of the input contains a single integer t $(1 \leq t \leq 10)$ — the number of test cases.

Then one line for each test case contains the string S consisting of '0's and '1's ($1 \leq |S| \leq 10^5$)

Output

Print one integer – number of substrings that contain only '1's

input
1 101110
output
7

In the example, there are 7 substrings with only '1's.

101110
101110
101110
101110
101110
101110
101110

D. Count Increasing Subarrays 2

1 second, 256 megabytes

Saad created a new game consisting of multiple levels, each representing a problem that players must solve to progress. He challenged Reda to play the game, and Reda accepted the challange, and successfully solved numerous problems. However, Reda found the problems to be too easy and bored, and he told Saad that he would't last in the game. Saad became angry and decided to give him the most challenging problem in the game. He challenged him to solve it within a maximum of two days. Reda accepted the challenge but, unfortunately, he was unable to solve the problem on his own. So he asked your help to avoid losing the challenge.

The challenge was as follows.

Given an array a contains n **distinct** numbers.

Count the number of strictly increasing subarrays.

Input

First line contains an interger n $(1 \leq n \leq 10^5)$.

Second line contains n intergers , the elements of the array $(1 \leq a_i \leq 10^7)$.

Output

Print the number of strictly increasing subarrays.

input
5 2 4 6 1 5
output
9

E. Game

1 second, 256 megabytes

In a simple number game, two players each choose a number. The player with the smaller number loses the game. If both players choose the same number, the game ends in a draw. Your task is to determine the outcome: who loses the game, or if it's a draw.

Input

The first line contains an integer a $(1 \leq a \leq 1000)$, representing the number chosen by the first player.

The second line contains an integer b $(1 \leq b \leq 1000)$, representing the number chosen by the second player.

Output

Output a single line with one of the following:

- `"p1"` if the first player loses,
- `"p2"` if the second player loses,
- `"d"` if the game is a draw.

input
1 3
output
p1

input
9 9
output
d

F. Triple Riot

1 second, 256 megabytes

One day, the three rioters Romeo, Kaneki, and Conan are playing a wonderful game. In this game, they take turns. Everyone has to ask the others one question. The person who solves this question first wins the round.

In this round, Romeo will ask Kaneki and Conan, and you have to help Conan to win this time (as Kaneki always defeats Conan).

The question is: you will be given n numbers, and you have to print all **common divisors** of these numbers.

Input

The first line contains $T \leq 7$ – number of test cases.

The first line of each test case contains an integer n ($1 \leq n \leq 10^5$).

The second line contains n space-separated integers $a_1, a_2, .., a_n$ ($0 \leq a_i \leq 10^{12}$).

It's guaranteed that there is at least one **non-zero** number in the given array.

Output

The first line of every test case output contains only one integer m – number of common divisors.

The second line contains m space-separated integers – the common divisors of the array. The common divisors should be sorted in $increasing$ order.

input

```
2
3
4 8 16
5
2 9 1 5 55
```

output

```
3
1 2 4
1
1
```

input

```
1
4
20 2 10 33
```

output

```
1
1
```

input

```
1
3
0 2 4
```

output

```
2
1 2
```

If an integer a is divisible by another integer b, then b is called the **divisor** of a.

G. Deal With Meal

6 seconds, 256 megabytes

Bob finds himself in a state of hunger but is restricted by a limited budget, prompting him to conduct meticulous research before making any dining decisions. He visits a restaurant boasting N distinct dishes and M varieties of sauces. Each meal can be created by combining one dish with one sauce, with the total cost of the meal determined by the sum of the respective costs of the dish and sauce. Bob is keen on identifying the K most affordable unique meals that can be concocted from the available N dishes and M sauces. A meal is considered unique if there are no other meals with the same combination of dish and sauce.

Input

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

The first line of each test case comprises three integers: N, M, and K, representing the count of dishes, the count of sauces, and the number of cheapest meals, respectively.

$1 \leq K \leq min(n * m, 10^5)$

$1 \leq N, M \leq 10^5$.

The second line contains N elements, indicating the costs of each dish sorted in a nondecreasing order.

The third line includes M elements, indicating the costs of each sauce sorted in a nondecreasing order.

The cost of each dish and each sauce will not exceed 10^9

Output

For each test case present the K most economical meals in ascending order of the cost, following the format $\{(d1, s1), (d2, s2), \ldots, (dk, sk)\}$.

If there are multiple pairs that satisfy the same cost print the pairs with the minimum dish index and if there are multiple pairs with the same dish index print the pairs with the minimum sauce index

input

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

output

```
1 1
1 2
2 1
2 2
```

H. Where is Alice ?

2 seconds, 256 megabytes

Bob has immersed himself in a newly designed game featuring an unspecified number of levels, denoted as N. Upon conquering each level starting from **level 1**, Bob earns points equivalent to the numerical value of the level and then moves to the next level **level 2** and so on. However, a twist arises when Alice coincides with Bob on a particular level, she takes the points of this level, compelling Bob to advance to the next level devoid of any points from the shared encounter.

Your task is to determine the specific level at which Alice intercepted Bob.

Input

The first line contains an integer T $(1 \leq T \leq 100000)$ the number of test cases.

for each test case a single integer P $(1 <= P <= 10^9)$, indicates the total points acquired by Bob.

Output

for each test case output a line The level at which Alice made her appearance, If there are several possible answers, output any of them.

input

```
2
4
6
```

output

```
2
4
```

I. Neutralizer

1 second, 256 megabytes

I guess you do not know who I am... Now you will...

The neutralizer is a brave guy that accomplishes missions whenever he is asked to. An organization made an agreement with him to let him live in peace as long as he does some surveillance on a target.

As a bad organization, they have a lot of targets, but they do not just ask for the neutralizer's help whenever a target is added to their list.

You will be given a lot of queries with the following types:

- 1 p denotes that a target with power p is added to the list
- 2 denotes that the organization asks for the neutralizer's help

For each time i at which the neutralizer is called for his help, he does surveillance on the top i powerful targets in the list. For example, the 1st time he considers the most powerful target, the 2nd time he considers the top 2 powerful targets, and so on.

Help the neutralizer by telling him the sum of his targets' powers. Notice that targets will **never** be removed from the list.

Input

The first line contains a single integer q $(1 \leq q \leq 10^5)$ – denoting the number of queries.

Each of the next q lines contains one of the two types of queries mentioned above ($1 \leq p \leq 10^{12}$).

It's guaranteed that the number of queries of type 1 before any query with type 2 will be greater than or equal to the number of queries with type 2 that have appeared.

Output

For each query of type 2, tell the neutralizer the sum of the targets he should do surveillance on.

input
10 1 10 1 6 1 4 1 3 1 8 2 2 1 2 1 4 1 4

output
10 18

J. Problem Setters

1 second, 256 megabytes

Judges and problem setters always have a hard time finding the perfect problem for the contestants. They even sometimes have a fight over it so the supervisors had to intervene.

They forced a rule for choosing problems. This rule states that no problem is chosen if one of the problem setters does not approve it. That has led the problem setters to propose multiple problems since they expect that it will be very hard to choose problems thereafter. The supervisors even increased the number of problem setters extensively because of that.

Now, they face another problem, which is that it is too difficult to count the number of chosen problems. Help them and create a program that does so.

Input

The first line contains 2 integers n and m ($1 \leq n \times m \leq 10^6$) – where n denotes the number of judge while m denotes the number of proposed problems.

Each of the next n contains a binary string of m letters that contains only 0's and 1's.

Output

Print the number of chosen problems.

input
1 5 11110

output
4

input
5 5 10101 10001 11110 11111 01110

output
0

K. Rate My Problem

2 seconds, 256 megabytes

Alice, a game designer, has conceptualized a new game and requests Bob's evaluation.

The game is presented as an array of numbers. Bob assesses the game by generating all subarrays with length greater than 1 from the given array, each serving as a distinct level within the game.

To determine the difficulty of each level, Bob **sorts** the current subarray and calculates the number of indices where the difference between the value at index $i+1$ and the value at index i is more than 1. In a more formal context, Bob aims to identify the number of indices i that fulfill the equation $a[i+1]-a[i]>1$.

The overall evaluation of the game is computed by aggregating the difficulties of all the levels.

Input

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

for each test case The first line is a single integer, n, where $1 \leq n \leq 1000$, denotes the size of the array.

The second line consists of n elements representing the array, with each element falling within the range $1 \leq \text{arr}[i] \leq 1000$.

Output

for each test case Print one line, the overall evaluation of the game.

input
2 4 2 3 1 4 5 1 3 3 3 5

output
3 8

L. Cars

1 second, 256 megabytes

Moamen has n cars, and he needs to buy an extra m cars, but before he buys the extra ones, he will sell x cars.

Can you tell Moamen the total number of cars that he will have?

Input

One line contains three numbers n,m,x $(1 \leq x \leq n, m \leq 100)$

Output

Print one integer representing the answer.

input
5 3 1

output
7

input
3 3 3

output
3

M. Coach Academy PST

1 second, 256 megabytes

The Coach Academy Spring Training is about to start! Students who have applied for the training program will first participate in a qualification contest to determine the most suitable level for their skillset. The contest aims to assess the students' problem-solving abilities and place them in the appropriate training level.

Maged has joined the contest and solved n problems; he would like to know what the most suitable level for his skills is. The contest consists of a finite number of problems, each representing a skill level in problem-solving. Additionally, the training consists of four levels, and each level requires a minimum number of problems to be solved during the contest for eligibility to join.

Given the number of problems that Maged has solved and the minimum number of problems required to join each of the four levels, help Maged find the most suitable level for his skills or determine if he is not yet qualified.

Input

The first line of input consists of a single integer n $(0 \leq n \leq 14)$ — the number of problems Maged has solved during the contest.

The second line contains four distinct integers L_1, L_2, L_3, L_4 $(0 \leq L_1 < L_2 < L_3 < L_4 \leq 14)$ — the minimum number of problems required to join each level, respectively.

Output

Output a single integer denoting the most suitable level Maged can join, or -1 if Maged's skills are below the minimum requirements.

input
10 2 5 8 11
output
3

input
0 1 2 3 4
output
-1