1. Distribute Books

Problem Description

For enhancing the book reading, school distributed story books to students as part of the Children's day celebrations.

To increase the reading habit, the class teacher decided to exchange the books every weeks so that everyone will have a different book to read. She wants to know how many possible exchanges are possible.

If they have 4 books and students, the possible exchanges are 9. Bi is the book of i-th student and after the exchange he should get a different book, other than Bi.

B1 B2 B3 B4 - first state, before exchange of the books

B2 B1 B4 B3

B2 B3 B4 B1

B2 B4 B1 B3

B3 B1 B4 B2

B3 B4 B1 B2

B3 B4 B2 B1

B4 B1 B2 B3

B4 B3 B1 B2

B4 B3 B2 B1

Find the number of possible exchanges, if the books are exchanged so that every student will receive a different book.

Constraints

$1 <= N <= 1000000$

Input Format

Input contains one line with N, indicates the number of books and number of students.

Output

Output the answer modulo 1000000007.

Test Case

Explanation

Example 1

2. Min Combinations

Problem Description

Alexander The great, while roaming the stretch of Turkey, came across a wise man.

He asked the wise man, "Who is the greatest conqueror of all?". The wise man replied, "A person with great strength and intelligence. Whosoever can solve my puzzle will go on to become the greatest!". The puzzle is as follows; Given two integers 'n1' and 'n2', select two integers 'a' and 'b', such as to solve the equation ($n1 * a + n2 * b = x$). But there is a catch, 'x' is the smallest positive integer which satisfies the equation. Can you help Alexander become the greatest?

Constraints

$1 <= T <= 1000$

$-10^7 <= a, b <= 10^7$

$0 <= n1, n2 <= 10^7$

Input Format

The first line contains the number of Test cases T.

Next T lines contains two space-separated integers, n1 and n2.

Output

Print the value of x.

Test Case

Explanation

Example 1

Input

1

34818 45632

Output

2

Given n1 = 34818 and n2 = 45632, if we choose a = 3553 and b = -2711, we get

=> n1 * a + n2 * b = x

=> 34818 * 3553 + 45632 * (-2711)

=> 2

Note: No other value of a and b, within the range, will give smaller value than 2.

3. Balancing Stars

Problem Description

CODU loves to play with string of brackets.

He considers string as a good string if it is balanced with stars. A string is considered as balanced with stars if string contains balanced brackets and between every pair of bracket i.e. between opening and closing brackets, there are at least 2 stars(*) present. CODU knows how to check whether a string is balanced or not but this time he needs to keep a track of stars too. He decided to write a program to check whether a string is good or not. But CODU is not as good in programming as you are, so he decided to take help from you. Will you help him for this task? You need to print Yes and number of balanced pair if string satisfies following conditions(string is good if it satisfies following 2 conditions):

1. The string is balanced with respect to all brackets.

2. Between every pair of bracket there is at least two stars.

However if string doesn't satisfies above conditions then print No and number of balanced pair in string as an output.

Constraints

4 <= String length <= 1000

Input Format

The first and only line of input contains a string of characters(a-z,A-Z), numbers(0-9), brackets('{', '[', '(', ')', ']', '}') and stars(*).

Output

Print space separated "Yes" (without quotes) and number of balanced pair if string is good. Else print "No" (without quotes) and number of balanced pair.

Test Case

Explanation

Example 1

Input

{**}

Output

Yes 1

Explanation

Here string contains one balanced pair {} and between this pair of bracket there are 2 stars present so the output is Yes with the count of balanced pair as 1.

Example 2

Input

{**(**{**[**]})}

Output

Yes 4

Explanation

String has balanced brackets and also satisfies 2nd condition. So the output is Yes with count of balanced pair which is 4.

Example 3

Input

**}xasd[**]sda231

Output

No 1

Explanation

In this case string is not balanced. So the output is No with the count of balanced pair as 1.

4. Market Survey

Problem Description

Market Research firm is carrying out a survey regarding popular brands. The person who has the best pulse of the survey population will be rewarded by the firm.

The survey comprises of N questions was taken by M participants, not at the same time but one after the other. Clearly, there is no correct answer since it is a survey of brands. Each question can have only four options (1,2,3,4). Most expected answers to different questions is used as a template to measure brand popularity. Think of this as a default answer sheet where the question paper is the Survey.

'0' represents no answer to a question. Thus it means that the participant has skipped answering that question.

Right Answer:

For a particular question, the highly chosen option till that point of time is treated as the correct answer. If multiple options have the same count, then out of those options the one which was chosen recently is treated as the right answer.

Score of a Participant:

One point will be awarded for each right answer. No negative points for wrong answers.

Instant Result:

This is shared to the Participant instantly after completion of his/her exam. (this is equal to number of right answers)

Final Result:

Only the final top scorer(TOPPER) is announced along with his score.

Note:

At the end of all M Participants completing the exam, the final right answers gets decided.

Based on these answers score of each candidate gets recalculated and the one with highest score is the TOPPER!!!

If more than one Participant gets the top score then the one among them who attempted the exam first, is treated as TOPPER.

Constraints

$1 <= N,M <= 1000$

Input Format

First line contains N (number of questions)

Second line contains M (number of Participants)

Third line contains N integers separated with space (default answers)

Next M lines contains N integers separated with space (response of M participants)

Output

First M lines showing the instant results of each Participant.

Last line containing the TOPPER's id and his score

(assume id's start with 1)

Test Case

Explanation

Example 1

Input

10

2

1 2 3 4 1 2 3 4 1 2

1 2 4 4 3 2 3 1 1 3

2 3 4 4 1 2 3 1 1 2

Output

6

6

1 8

Explanation

Number of questions = 10

Number of Participants = 2

Default answers : 1 2 3 4 1 2 3 4 1 2

(Latest Key is same as Default answers)

First Participant answers : 1 2 4 4 3 2 3 1 1 3

Right answers : 6 (= Instant result of first Participant)

Latest Key : 1 2 4 4 3 2 3 1 1 3

Second Participant's answers : 2 3 4 4 1 2 3 1 1 2

Right answers : 6 (= Instant result of second Participant)

Latest Key : 1 2 4 4 1 2 3 1 1 2

Final key : 1 2 4 4 1 2 3 1 1 2

(Final Key is same as Latest Key at the end of all Participants completing the exam)

Right answers of Participant1 = Right answers of Participant2 = 8.

So topper is first Participant with score 8.

5. Angels vs Devils

Problem Description

In a board game (12x12) of Angels vs Devils, various devils try to kill an angel whose aim is to get across the board. Person playing for devil can place 3 devils at any cell on the board, each devil has different powers.

Starting point of Angel can only be on border but not corners of the board and will be provided as input. He will walk in a straight line (horizontal or vertical only) across the board, one cell every second. For example, if he is placed on the left border he will move right towards the right border. Starting points and types of devils will be provided as input, their powers are as follows (please also refer the image in Example 1).

OGRE (O): He cannot move but he can kill with his breath. His powers change with time.

· In 1st second Ogre can kill angel if the angel reaches Ogre's location

· In 2nd second Ogre can kill angel surrounding upto 8 neighbouring cells (see diagram)

· In 3rd second Ogre can kill angel if the angel reaches Ogre's location

· In 4th second Ogre is powerless i.e. even if angel reaches Ogre's location, Ogre cannot harm him

XiXi (X): He has the power to kill an angel only if both the following conditions are true

· He is active

· Angel is on same colored cell as XiXi

XiXi is active only for 1 particular second in this game. According to Figure 1, XiXi is on cell D8. What this means is – XiXi will be active only in 8th second and if and only if angel is on blue colored square at 8th second, XiXi can kill the angel.

ZeeSNAKE (Z): He leaves a poison trail and moves in 'Z' shape. His first move is 'down' and then 'right' and keeps on making a trail in that order until he reaches the border. If he reaches the 'Bottom Border' he starts moving 'up' instead of 'down' and vice-versa. If he reaches the 'Right Border' he starts moving 'left' instead of 'right' and vice-versa. Angel coming on the poison box will die immediately. Trail created by him till 12th second is shown in Figure 1

You need to provide the box number on which the Angel gets killed, or output 'SS' if Angel successfully crosses the board

Constraints

Angel starts from the border but not from the corners (i.e. cells A1, A12, L1 and L12)

Starting points of angel and all the devils will be different

Powers of devils do not conflict. Thus if an angel reaches a cell which is under influence of more than one devil's power, the angel will still get killed

Angel cannot stop, he has to move every second

Input Format

First Line contains the starting point of Angel at t = 1.

Second Line contains the types of devils in order delimited by comma (,).

Third Line contains starting points of devils (at t = 1) in order delimited by comma (,).

Output

Cell number where the angel gets killed, if angel does not get killed then print "SS"

Test Case

Explanation

Example 1

Input

K12

O,X,Z

I3,D8,C4

Output

K5

Explanation

Angel will be killed by the Devil XiXi as at the 8th second, he can kill angel on blue boxes

Figure. 1.

Example 2

Input

I12

Z,O,X

K2,B10,G3

Output

SS

Explanation

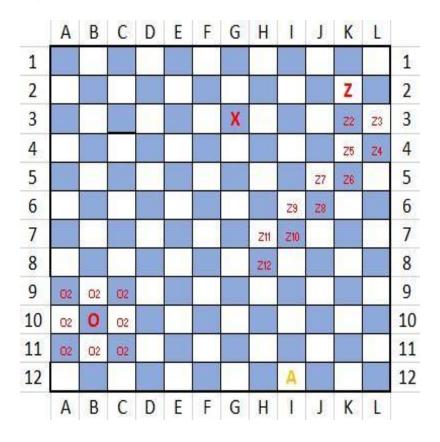Angel is successfully saved because no devil's power is able to harm him.

Figure. 2.

6. Grooving Monkeys

Problem Description

N monkeys are invited to a party where they start dancing. They dance in a circular formation, very similar to a Gujarati Garba or a Drum Circle. The dance requires the monkeys to constantly change positions after every 1 second.

The change of position is not random & you, in the audience, observe a pattern. Monkeys are very disciplined & follow a specific pattern while dancing.

Consider N = 6, and an array monkeys = {3,6,5,4,1,2}.

This array (1-indexed) is the dancing pattern. The value at monkeys[i], indicates the new of position of the monkey who is standing at the ith position.

Given N & the array monkeys[ ], find the time after which all monkeys are in the initial positions for the 1st time.

Constraints

1<=t<=10 (test cases)

1<=N<=10000 (Number of monkeys)

Input Format

First line contains single integer t, denoting the number of test cases.

Each test case is as follows -

Integer N denoting the number of monkeys.

Next line contains N integer denoting the dancing pattern array, monkeys[].

Output

t lines,

Each line must contain a single integer T, where T is the minimum number of seconds after which all the monkeys are in their initial position.

Test Case

Explanation

Example 1

Input

1

6

3 6 5 4 1 2

Output

6

Explanation

Consider N = 6, and an array monkeys = {3,6,5,4,1,2}.

Suppose monkeys are a,b,c,d,e,f, & Initial position (at t = 0) -> a,b,c,d,e,f

At t = 1 -> e,f,a,d,c,b

a will move to 3rd position, b will move to 6th position, c will move to 5th position, d will move to 4th position, e will move to 1st position and f will move to 2nd position. Thus from a,b,c,d,e,f at t =0, we get e,f,a,d,c,b at t =1. Recursively applying same transpositions, we get following positions for different values of t.

At t = 2 -> c,b,e,d,a,f

At t = 3 -> a,f,c,d,e,b

At t = 4 -> e,b,a,d,c,f

At t = 5 -> c,f,e,d,a,b

At t = 6 -> a,b,c,d,e,f

Since at t = 6, we got the original position, therefore the answer is 6.