bld.ai Summer22 Internship Contest [Official]

A. Prefix Strings

2 seconds, 256 megabytes

Given an array A of N strings, and Q queries. For each query, you will be given a string S, and you are asked to print the number of strings in the given array that have a prefix equals to (start with) S.

For example, if A is ["abcd", "bea", "adbf", "ab", "abf"], and S is "ab", so the answer is 3 ("abcd","ab","abf").

Input

The first line contains two integer numbers $N(1 \leq N \leq 10^5)$, and $Q(1 \leq Q \leq 10^5)$.

The second line contains N strings representing the array $A(1 \leq |A_i| \leq 10)$.

The i^{th} line of the next Q lines contains a string $S_i(1 \leq |S_i| \leq 10)$ representing the given string for the i^{th} query.

All strings consist of small English letters.

Output

Print Q lines. The i^{th} line of them should contain the answer for the i^{th} query.

input
5 4 abcd bea adbf ab abf ab a nab b
output
3 4 0 1

B. Number of Minimums

1 second, 256 megabytes

Nasser gives Taha a problem to solve. Given a one-indexed integer array A of length N. For each index i $(1 \leq i \leq N)$, print the number of occurrences of the minimum number in the subarray $[A_i : A_N]$. Help Taha to solve this problem.

Input

The first line contains one integer number $N(1 \leq N \leq 10^5)$.

The second line contains N integer numbers representing the array $A(1 \leq A_i \leq 10^9)$.

Output

Print one line containing N integer numbers. The i^{th} of them should be the answer for index i.

input
5 2 1 2 3 2
output
1 1 2 1 1

C. Maximum Equation

1 second, 512 megabytes

You are given N inequalities with M variables in the following form:

$A_{11}X_1 + A_{12}X_2 + \ldots + A_{1M}X_M \leq B_1$

$A_{21}X_1 + A_{22}X_2 + \ldots + A_{2M}X_M \leq B_2$

. . . . . .

. . . . . .

$A_{N1}X_1 + A_{N2}X_2 + \ldots + A_{NM}X_M \leq B_N$

You are also given the following equation:

$Z = C_1X_1 + C_2X_2 + \ldots + C_MX_M$

Note that X is a symbol for variables, A and C are symbols for coefficients, and B is a symbol for constants.

Your task is to find M non-negative values for the variables $[X_1 : X_M]$ that maximize the value of Z with satisfying the N inequalities.

Input

The first line contains two integer numbers N and M $(1 \leq N, M \leq 100)$

The i^{th} line of the following N lines contains M integer numbers representing the coefficients of the i^{th} inequality: $A_{i1}, A_{i2}, \ldots, A_{iM}$ $(-100 \leq A_{ij} \leq 100)$

The following line contains N integer numbers representing the inequalities' constants: $B_1, B_2, \ldots, B_N$ $(-10^6 \leq B_i \leq 10^6)$

The last line contains M integer numbers representing the coefficients of Z equation: $C_1, C_2, \ldots, C_M$ $(-100 \leq C_j \leq 100)$

Output

In case of no answer, print **NO**.

In case of unbounded answer, print **INF**.

In case of bounded answer, print **YES** in the first line, and M float numbers (**with exactly 18 digits after the floating point**) in the second line representing the optimal values for the variables $[X_1 : X_M]$

If there is more than one combination of $[X_1 : X_M]$ values, print any of them.

Your solution will be accepted if the inequalities are satisfied and the calculated maximum value of Z has absolute error of at most 10^{-3}.

input
3 2 -1 -1 1 0 0 1 -1 2 2 -1 2
output
YES 0.000000000000000000 2.000000000000000000

input
2 2 1 1 -1 -1 1 -2 1 1
output
NO

input
1 3 0 0 1 3 1 1 1
output
INF

D. Final Exam

2 seconds, 512 megabytes

Nasser is a teacher. He has N students who should take his final exam. Nasser has wrote M true or false questions. Each student should choose exactly two questions and answer them. A student will pass the exam, if he/she answers at least one question correctly.

Nasser wants all of his students to pass his final exam, so he decided to write the exam model answer depending on the students' answers. He believes that it is not always possible to do that because there might be some conflicts among the students' answers.

Nasser is asking for your help to find out if it's possible to write a model answer that makes all of his student pass his final exam.

Input
The first line contains two integer numbers $N(1 \leq N \leq 10^5)$ and $M(2 \leq M \leq 10^5)$.

The i^{th} line of the following N lines contains two non-zero integer numbers representing the answers for the i^{th} student $(-M \leq answer \leq M, answer \neq 0)$

If $answer = 3$, this means that the student's answer for the third question is true.

If $answer = -4$, this means that the student's answer for the fourth question is false.

Output
If there is no any possible model answer, print -1.

Otherwise, print one line containing M zero-or-one integer numbers. The i^{th} of them should represent the model answer for the i^{th} question, where zero means false and one means true. If there are more than one possible model answer, print any of them.

input
3 3 1 -3 -1 2 -2 -3
output
0 0 0

input
4 2 -1 2 1 2 1 -2 -1 -2
output
-1

E. Maximum Front

1 second, 256 megabytes

You are given an integer array A, and an initially-empty array B. In one move, you can perform one of the following operations:

- Move the front element of array A to array B, if array A is not empty.

- Move any element of array B to the front of array A, if array B is not empty.

Your task is to find the maximum possible front element of array A after **exactly** K moves. You should end up with non-empty array A.

Input
The first line contains two integer numbers $N(2 \leq N \leq 10^5)$ and $K(0 \leq K \leq 10^9)$.

The second line contains N integer numbers representing the array A $(0 \leq A_i \leq 10^9)$.

Output
Print one integer number representing the described answer.

input
6 4 7 4 4 6 2 8
output
7

input
2 2 2 3
output
2

F. Longest Subarray

1 second, 256 megabytes

You are given an integer array A of length N, and an integer K. Your task is to find the longest length of **non-empty** contiguous subarray whose sum equals to a multiple of K. If there is no such subarray, the answer is 0.

The subarray of A is a contiguous part of the array A i. e. the array $(A_i, A_{i+1}, \ldots, A_j)$ for some $(1 \leq i \leq j \leq N)$.

Input
The first line contains two integers N $(1 \leq N \leq 10^5)$ and K $(1 \leq K \leq 10^9)$.

The second line contains N integers $A_1, A_2, \ldots, A_N$ $(0 \leq A_i \leq 10^9)$.

Output
Print one integer number representing the described answer.

input
5 6 23 2 4 6 8
output
3

G. Maximum People

2 seconds, 256 megabytes

You are given a connected bidirectional graph which represents the map of some city. The city consists of N nodes and M edges. Each edge can hold at most some number of people at the same time.

You are asked Q queries. For each query, you are given two different nodes, and you are asked to find the maximum number of people to go **together, at the same time, and through the same path** from one of the two nodes to the other.

Input

The first line contains two integer numbers $N(2 \leq N \leq 10^4)$ and $M(1 \leq M \leq 10^5)$.

The i^{th} line of the next M lines contains three integer numbers A_i, B_i, and P_i $(1 \leq A_i, B_i \leq N, A_i \neq B_i, 0 \leq P_i \leq 10^5)$ representing an edge from node A_i to node B_i with P_i maximum number of people to hold at the same time.

The following line contains one integer number $Q(1 \leq Q \leq 10^5)$.

The i^{th} line of the next Q lines contains two integer numbers A_i and B_i $(1 \leq A_i, B_i \leq N, A_i \neq B_i)$ representing the two nodes of the i^{th} query.

Output

For each query, print one line containing one integer number representing the described answer for that query.

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

H. Nasser's Tree

1 second, 256 megabytes

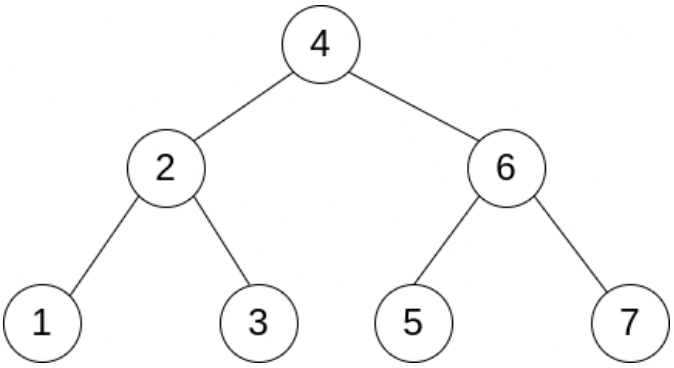
Nasser's tree is simply a binary tree whose nodes values can be calculated using the following formula.

To get the value of the I^{th} node at level L in a Nasser's tree with height H:

$$NodeValue(H, L, I) = 2^{H-L} \times (2I - 1)$$

where $1 \leq L \leq H$ and $1 \leq I \leq 2^{L-1}$

For example, Nasser's tree of height 3 looks like this:



You are asked Q queries. For each query, you will be given the height of Nasser's tree and the values of two different nodes in that tree. Your task is to find the value of the lowest common ancestor for these two nodes.

The lowest common ancestor of two nodes is the node with the largest depth whose subtree contains these two nodes.

Input

The first line contains one integer number $Q(1 \leq Q \leq 10^4)$.

The i^{th} line of the following Q lines contains three integer numbers: H_i $(2 \leq H_i \leq 60)$, A_i and B_i $(1 \leq A_i, B_i < 2^{H_i}, A_i \neq B_i)$ representing Nasser's tree height and the values of the two nodes for the i^{th} query.

Output

For each query, print one line containing one integer number representing the described answer for that query.

input
4 3 1 3 3 3 7 2 1 2 4 10 13
output
2 4 2 12

I. Strong Password

1 second, 256 megabytes

Nasser has two weak passwords that he usually uses. He decided to create a strong password by merging those two weak passwords.

$$Merge(A, B) = A[0], B[0], A[1], B[1], A[2], B[2] \ldots\ldots$$

If one of the two weak passwords ends before the other, add the rest of the characters to the end of the resulting strong password.

Given the two weak passwords A and B, help Nasser to get his strong password generated by $Merge(A, B)$.

Input

The first line contains a string of small English letters representing the first weak password $A(1 \leq |A| \leq 10^4)$.

The second line contains a string of small English letters representing the second weak password $B(1 \leq |B| \leq 10^4)$.

Output

Print one line containing a string of small English letters representing the strong password generated by $Merge(A, B)$.

input
xyz abcde
output
xaybzcde

J. Bugs Couples

3 seconds, 512 megabytes

There are N male bugs and N female bugs. You are given $N \times N$ array of zeroes and ones A. if $A_{i,j} = 1$, this means that the i^{th} male bug and the j^{th} female bug can live together and form a bug couple.

Your are asked to find the number of ways to make N bug couples. As the answer might be so large, print it modulo $10^9 + 7$.

Input

The first line contains one integer number $N(1 \leq N \leq 20)$.

Each of the following N lines contains N zero-or-one integer number representing the array $A(0 \leq A_{i,j} \leq 1)$.

Output

Print one integer number representing the described answer.

input
3 0 1 1 1 0 1 1 1 1
output
3

For the mentioned test case, there three way to form three bug couples:

- $(1, 2), (2, 1), (3, 3)$

- $(1, 2), (2, 3), (3, 1)$

- $(1, 3), (2, 1), (3, 2)$