Codeforces Round #291 (Div. 2)

A. Chewbacca and Number

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Luke Skywalker gave Chewbacca an integer number x. Chewbacca isn't good at numbers but he loves inverting digits in them. Inverting digit t means replacing it with digit $9 - t$.

Help Chewbacca to transform the initial number x to the minimum possible **positive** number by inverting some (possibly, zero) digits. The decimal representation of the final number shouldn't start with a zero.

Input
The first line contains a single integer x ($1 \le x \le 10^{18}$) — the number that Luke Skywalker gave to Chewbacca.

Output
Print the minimum possible positive number that Chewbacca can obtain after inverting some digits. The number shouldn't contain leading zeroes.

Examples

input
27
output
22

input
4545
output
4444

B. Han Solo and Lazer Gun

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

There are n Imperial stormtroopers on the field. The battle field is a plane with Cartesian coordinate system. Each stormtrooper is associated with his coordinates (x, y) on this plane.

Han Solo has the newest duplex lazer gun to fight these stormtroopers. It is situated at the point (x_0, y_0). In one shot it can can destroy all the stormtroopers, situated on some line that crosses point (x_0, y_0).

Your task is to determine what minimum number of shots Han Solo needs to defeat all the stormtroopers.

The gun is the newest invention, it shoots very quickly and even after a very large number of shots the stormtroopers don't have enough time to realize what's happening and change their location.

Input

The first line contains three integers n, x_0 и y_0 ($1 \le n \le 1000$, $-10^4 \le x_0, y_0 \le 10^4$) — the number of stormtroopers on the battle field and the coordinates of your gun.

Next n lines contain two integers each x_i, y_i ($-10^4 \le x_i, y_i \le 10^4$) — the coordinates of the stormtroopers on the battlefield. It is guaranteed that no stormtrooper stands at the same point with the gun. Multiple stormtroopers can stand at the same point.

Output

Print a single integer — the minimum number of shots Han Solo needs to destroy all the stormtroopers.

Examples

input
4 0 0 1 1 2 2 2 0 -1 -1
output
2

input
2 1 2 1 1 1 0
output
1

Note

Explanation to the first and second samples from the statement, respectively:

C. Watto and Mechanism

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Watto, the owner of a spare parts store, has recently got an order for the mechanism that can process strings in a certain way. Initially the memory of the mechanism is filled with n strings. Then the mechanism should be able to process queries of the following type: "Given string s, determine if the memory of the mechanism contains string t that consists of the same number of characters as s and differs from s in exactly one position".

Watto has already compiled the mechanism, all that's left is to write a program for it and check it on the data consisting of n initial lines and m queries. He decided to entrust this job to you.

Input

The first line contains two non-negative numbers n and m ($0 \le n \le 3 \cdot 10^5$, $0 \le m \le 3 \cdot 10^5$) — the number of the initial strings and the number of queries, respectively.

Next follow n non-empty strings that are uploaded to the memory of the mechanism.

Next follow m non-empty strings that are the queries to the mechanism.

The total length of lines in the input doesn't exceed $6 \cdot 10^5$. Each line consists **only** of letters `'a'`, `'b'`, `'c'`.

Output

For each query print on a single line "YES" (without the quotes), if the memory of the mechanism contains the required string, otherwise print "NO" (without the quotes).

Examples

input
2 3 aaaaa acacaca aabaa ccacacc caaac
output
YES NO NO

D. R2D2 and Droid Army

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

An army of n droids is lined up in one row. Each droid is described by m integers $a_1, a_2, \ldots, a_m$, where a_i is the number of details of the i-th type in this droid's mechanism. R2-D2 wants to destroy the sequence of consecutive droids of maximum length. He has m weapons, the i-th weapon can affect all the droids in the army by destroying one detail of the i-th type (if the droid doesn't have details of this type, nothing happens to it).

A droid is considered to be destroyed when all of its details are destroyed. R2-D2 can make at most k shots. How many shots from the weapon of what type should R2-D2 make to destroy the sequence of consecutive droids of maximum length?

Input

The first line contains three integers n, m, k ($1 \le n \le 10^5$, $1 \le m \le 5$, $0 \le k \le 10^9$) — the number of droids, the number of detail types and the number of available shots, respectively.

Next n lines follow describing the droids. Each line contains m integers $a_1, a_2, \ldots, a_m$ ($0 \le a_i \le 10^8$), where a_i is the number of details of the i-th type for the respective robot.

Output

Print m space-separated integers, where the i-th number is the number of shots from the weapon of the i-th type that the robot should make to destroy the subsequence of consecutive droids of the maximum length.

If there are multiple optimal solutions, print any of them.

It is not necessary to make exactly k shots, the number of shots can be less.

Examples

input
5 2 4 4 0 1 2 2 1 0 2 1 3
output
2 2

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

Note

In the first test the second, third and fourth droids will be destroyed.

In the second test the first and second droids will be destroyed.

E. Darth Vader and Tree

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

When Darth Vader gets bored, he sits down on the sofa, closes his eyes and thinks of an infinite rooted tree where each node has exactly n sons, at that for each node, the distance between it an its i-th left child equals to d_i. The Sith Lord loves counting the number of nodes in the tree that are at a distance at most x from the root. The distance is the sum of the lengths of edges on the path between nodes.

But he has got used to this activity and even grew bored of it. 'Why does he do that, then?' — you may ask. It's just that he feels superior knowing that only he can solve this problem.

Do you want to challenge Darth Vader himself? Count the required number of nodes. As the answer can be rather large, find it modulo $10^9 + 7$.

Input

The first line contains two space-separated integers n and x ($1 \le n \le 10^5$, $0 \le x \le 10^9$) — the number of children of each node and the distance from the root within the range of which you need to count the nodes.

The next line contains n space-separated integers d_i ($1 \le d_i \le 100$) — the length of the edge that connects each node with its i-th child.

Output

Print a single number — the number of vertexes in the tree at distance from the root equal to at most x.

Examples

input
3 3 1 2 3
output
8

Note

Pictures to the sample (the yellow color marks the nodes the distance to which is at most three)