Codeforces Round #305 (Div. 2)

A. Mike and Fax

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

While Mike was walking in the subway, all the stuff in his back-bag dropped on the ground. There were several fax messages among them. He concatenated these strings in some order and now he has string s.

He is not sure if this is his own back-bag or someone else's. He remembered that there were exactly k messages in his own bag, each was a *palindrome* string and all those strings had the same length.

He asked you to help him and tell him if he has worn his own back-bag. Check if the given string s is a concatenation of k *palindromes* of the same length.

Input

The first line of input contains string s containing lowercase English letters ($1 \le |s| \le 1000$).

The second line contains integer k ($1 \le k \le 1000$).

Output

Print "YES"(without quotes) if he has worn his own back-bag or "NO"(without quotes) otherwise.

Examples

input
saba 2
output
NO

input
saddastavvat 2
output
YES

Note

Palindrome is a string reading the same forward and backward.

In the second sample, the faxes in his back-bag can be "saddas" and "tavvat".

B. Mike and Fun

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

Mike and some bears are playing a game just for fun. Mike is the judge. All bears except Mike are standing in an $n \times m$ grid, there's exactly one bear in each cell. We denote the bear standing in column number j of row number i by (i, j). Mike's hands are on his ears (since he's the judge) and each bear standing in the grid has hands either on his mouth or his eyes.

They play for q rounds. In each round, Mike chooses a bear (i, j) and tells him to change his state i. e. if his hands are on his mouth, then he'll put his hands on his eyes or he'll put his hands on his mouth otherwise. After that, Mike wants to know the score of the bears.

Score of the bears is the maximum over all rows of number of consecutive bears with hands on their eyes in that row.

Since bears are lazy, Mike asked you for help. For each round, tell him the score of these bears after changing the state of a bear selected in that round.

Input

The first line of input contains three integers n, m and q ($1 \le n, m \le 500$ and $1 \le q \le 5000$).

The next n lines contain the grid description. There are m integers separated by spaces in each line. Each of these numbers is either 0 (for mouth) or 1 (for eyes).

The next q lines contain the information about the rounds. Each of them contains two integers i and j ($1 \le i \le n$ and $1 \le j \le m$), the row number and the column number of the bear changing his state.

Output

After each round, print the current score of the bears.

Examples

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

C. Mike and Frog

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

Mike has a frog and a flower. His frog is named Xaniar and his flower is named Abol. Initially(at time 0), height of Xaniar is h_1 and height of Abol is h_2. Each second, Mike waters Abol and Xaniar.

So, if height of Xaniar is h_1 and height of Abol is h_2, after one second height of Xaniar will become $(x_1 h_1 + y_1) \bmod m$ and height of Abol will become $(x_2 h_2 + y_2) \bmod m$ where x_1, y_1, x_2 and y_2 are some integer numbers and $a \bmod b$ denotes the remainder of a modulo b.

Mike is a competitive programmer fan. He wants to know the minimum time it takes until height of Xania is a_1 and height of Abol is a_2.

Mike has asked you for your help. Calculate the minimum time or say it will never happen.

Input

The first line of input contains integer m ($2 \le m \le 10^6$).

The second line of input contains integers h_1 and a_1 ($0 \le h_1, a_1 < m$).

The third line of input contains integers x_1 and y_1 ($0 \le x_1, y_1 < m$).

The fourth line of input contains integers h_2 and a_2 ($0 \le h_2, a_2 < m$).

The fifth line of input contains integers x_2 and y_2 ($0 \le x_2, y_2 < m$).

It is guaranteed that $h_1 \neq a_1$ and $h_2 \neq a_2$.

Output

Print the minimum number of seconds until Xaniar reaches height a_1 and Abol reaches height a_2 or print -1 otherwise.

Examples

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

input
1023 1 2 1 0 1 2 1 1
output
-1

Note

In the first sample, heights sequences are following:

Xaniar: $4 \to 0 \to 1 \to 2$

Abol: $0 \to 3 \to 4 \to 1$

D. Mike and Feet

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

Mike is the president of country What-The-Fatherland. There are n bears living in this country besides Mike. All of them are standing in a line and they are numbered from 1 to n from left to right. i-th bear is exactly a_i feet high.

A group of bears is a non-empty contiguous segment of the line. The *size* of a group is the number of bears in that group. The *strength* of a group is the minimum height of the bear in that group.

Mike is a curious to know for each x such that $1 \le x \le n$ the maximum strength among all groups of size x.

Input

The first line of input contains integer n ($1 \le n \le 2 \times 10^5$), the number of bears.

The second line contains n integers separated by space, $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$), heights of bears.

Output

Print n integers in one line. For each x from 1 to n, print the maximum strength among all groups of size x.

Examples

input
10 1 2 3 4 5 4 3 2 1 6
output
6 4 4 3 3 2 2 1 1 1

E. Mike and Foam

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

Mike is a bartender at Rico's bar. At Rico's, they put beer glasses in a special shelf. There are n kinds of beer at Rico's numbered from 1 to n. i-th kind of beer has a_i milliliters of foam on it.

Maxim is Mike's boss. Today he told Mike to perform q queries. Initially the shelf is empty. In each request, Maxim gives him a number x. If beer number x is already in the shelf, then Mike should remove it from the shelf, otherwise he should put it in the shelf.

After each query, Mike should tell him the score of the shelf. Bears are geeks. So they think that the score of a shelf is the number of pairs (i, j) of glasses in the shelf such that $i < j$ and $\gcd(a_i, a_j) = 1$ where $\gcd(a, b)$ is the greatest common divisor of numbers a and b.

Mike is tired. So he asked you to help him in performing these requests.

Input

The first line of input contains numbers n and q ($1 \le n, q \le 2 \times 10^5$), the number of different kinds of beer and number of queries.

The next line contains n space separated integers, $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 5 \times 10^5$), the height of foam in top of each kind of beer.

The next q lines contain the queries. Each query consists of a single integer integer x ($1 \le x \le n$), the index of a beer that should be added or removed from the shelf.

Output

For each query, print the answer for that query in one line.

Examples

input
5 6 1 2 3 4 6 1 2 3 4 5 1

output
0 1 3 5 6 2