

Codeforces Round #260 (Div. 1)**A. Boredom**

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

Alex doesn't like boredom. That's why whenever he gets bored, he comes up with games. One long winter evening he came up with a game and decided to play it.

Given a sequence a consisting of n integers. The player can make several steps. In a single step he can choose an element of the sequence (let's denote it a_k) and delete it, at that all elements equal to $a_k + 1$ and $a_k - 1$ also must be deleted from the sequence. That step brings a_k points to the player.

Alex is a perfectionist, so he decided to get as many points as possible. Help him.

Input

The first line contains integer n ($1 \leq n \leq 10^5$) that shows how many numbers are in Alex's sequence.

The second line contains n integers a_1, a_2, \dots, a_n ($1 \leq a_i \leq 10^5$).

Output

Print a single integer — the maximum number of points that Alex can earn.

Examples

input
2 1 2
output
2
input
3 1 2 3
output
4
input
9 1 2 1 3 2 2 2 2 3
output
10

Note

Consider the third test example. At first step we need to choose any element equal to 2. After that step our sequence looks like this [2, 2, 2, 2]. Then we do 4 steps, on each step we choose any element equals to 2. In total we earn 10 points.

B. A Lot of Games

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

Andrew, Fedor and Alex are inventive guys. Now they invent the game with strings for two players.

Given a group of n non-empty strings. During the game two players build the word together, initially the word is empty. The players move in turns. On his step player must add a single letter in the end of the word, the resulting word must be prefix of at least one string from the group. A player loses if he cannot move.

Andrew and Alex decided to play this game k times. The player who is the loser of the i -th game makes the first move in the $(i + 1)$ -th game. Guys decided that the winner of all games is the player who wins the last (k -th) game. Andrew and Alex already started the game. Fedor wants to know who wins the game if both players will play optimally. Help him.

Input

The first line contains two integers, n and k ($1 \leq n \leq 10^5$; $1 \leq k \leq 10^9$).

Each of the next n lines contains a single non-empty string from the given group. The total length of all strings from the group doesn't exceed 10^5 . Each string of the group consists only of lowercase English letters.

Output

If the player who moves first wins, print "First", otherwise print "Second" (without the quotes).

Examples

input
2 3 a b
output
First

input
3 1 a b c
output
First

input
1 2 ab
output
Second

C. Civilization

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

Andrew plays a game called "Civilization". Dima helps him.

The game has n cities and m bidirectional roads. The cities are numbered from 1 to n . Between any pair of cities there either is a single (unique) path, or there is no path at all. A path is such a sequence of distinct cities v_1, v_2, \dots, v_k , that there is a road between any contiguous cities v_i and v_{i+1} ($1 \leq i < k$). The length of the described path equals to $(k - 1)$. We assume that two cities lie in the same region if and only if, there is a path connecting these two cities.

During the game events of two types take place:

1. Andrew asks Dima about the length of the longest path in the region where city x lies.
2. Andrew asks Dima to merge the region where city x lies with the region where city y lies. If the cities lie in the same region, then no merging is needed. Otherwise, you need to merge the regions as follows: choose a city from the first region, a city from the second region and connect them by a road so as to minimize the length of the longest path in the resulting region. If there are multiple ways to do so, you are allowed to choose any of them.

Dima finds it hard to execute Andrew's queries, so he asks you to help him. Help Dima.

Input

The first line contains three integers n, m, q ($1 \leq n \leq 3 \cdot 10^5$; $0 \leq m < n$; $1 \leq q \leq 3 \cdot 10^5$) — the number of cities, the number of the roads we already have and the number of queries, correspondingly.

Each of the following m lines contains two integers, a_i and b_i ($a_i \neq b_i$; $1 \leq a_i, b_i \leq n$). These numbers represent the road between cities a_i and b_i . There can be at most one road between two cities.

Each of the following q lines contains one of the two events in the following format:

- $1 \ x_i$. It is the request Andrew gives to Dima to find the length of the maximum path in the region that contains city x_i ($1 \leq x_i \leq n$).
- $2 \ x_i \ y_i$. It is the request Andrew gives to Dima to merge the region that contains city x_i and the region that contains city y_i ($1 \leq x_i, y_i \leq n$). Note, that x_i can be equal to y_i .

Output

For each event of the first type print the answer on a separate line.

Examples

input
6 0 6 2 1 2 2 3 4 2 5 6 2 3 2 2 5 3 1 1
output
4

D. Serega and Fun

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Serega loves fun. However, everyone has fun in the unique manner. Serega has fun by solving query problems. One day Fedor came up with such a problem.

You are given an array a consisting of n positive integers and queries to it. The queries can be of two types:

1. Make a unit cyclic shift to the right on the segment from l to r (both borders inclusive). That is rearrange elements of the array in the following manner:
$$a[l], a[l + 1], \dots, a[r - 1], a[r] \rightarrow a[r], a[l], a[l + 1], \dots, a[r - 1].$$
2. Count how many numbers equal to k are on the segment from l to r (both borders inclusive).

Fedor hurried to see Serega enjoy the problem and Serega solved it really quickly. Let's see, can you solve it?

Input

The first line contains integer n ($1 \leq n \leq 10^5$) — the number of elements of the array. The second line contains n integers $a[1], a[2], \dots, a[n]$ ($1 \leq a[i] \leq n$).

The third line contains a single integer q ($1 \leq q \leq 10^5$) — the number of queries. The next q lines contain the queries.

As you need to respond to the queries online, the queries will be **encoded**. A query of the first type will be given in format: $1 \ l'_i \ r'_i$. A query of the second type will be given in format: $2 \ l'_i \ r'_i \ k'_i$. All the number in input are integer. They satisfy the constraints: $1 \leq l'_i, r'_i, k'_i \leq n$.

To decode the queries from the data given in input, you need to perform the following transformations:

$$l_i = ((l'_i + lastans - 1) \bmod n) + 1; \quad r_i = ((r'_i + lastans - 1) \bmod n) + 1; \quad k_i = ((k'_i + lastans - 1) \bmod n) + 1.$$

Where $lastans$ is the last reply to the query of the 2-nd type (initially, $lastans = 0$). If after transformation l_i is greater than r_i , you must swap these values.

Output

For each query of the 2-nd type print the answer on a single line.

Examples

input
7 6 6 2 7 4 2 5 7 1 3 6 2 2 4 2 2 2 4 7 2 2 2 5 1 2 6 1 1 4 2 1 7 3
output
2 1 0 0

input
8 8 4 2 2 7 7 8 8 8 1 8 8 2 8 1 7 1 8 1 1 7 3 2 8 8 3 1 1 4 1 2 7 1 4 5
output
2 0

E. Function

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

Serega and Fedor play with functions. One day they came across a very interesting function. It looks like that:

- $f(1, j) = a[j], 1 \leq j \leq n.$
- $f(i, j) = \min(f(i - 1, j), f(i - 1, j - 1)) + a[j], 2 \leq i \leq n, i \leq j \leq n.$

Here a is an integer array of length n .

Serega and Fedya want to know what values this function takes at some points. But they don't want to calculate the values manually. So they ask you to help them.

Input

The first line contains integer n ($1 \leq n \leq 10^5$) — the length of array a . The next line contains n integers: $a[1], a[2], \dots, a[n]$ ($0 \leq a[i] \leq 10^4$).

The next line contains integer m ($1 \leq m \leq 10^5$) — the number of queries. Each of the next m lines contains two integers: x_i, y_i ($1 \leq x_i \leq y_i \leq n$). Each line means that Fedor and Serega want to know the value of $f(x_i, y_i)$.

Output

Print m lines — the answers to the guys' queries.

Examples

input
6 2 2 3 4 3 4 4 4 5 3 4 3 4 2 3
output
12 9 9 5

input
7 1 3 2 3 4 0 2 4 4 5 2 3 1 4 4 6
output
11 4 3 0