Codeforces Beta Round #56

A. Where Are My Flakes?

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

One morning the Cereal Guy found out that all his cereal flakes were gone. He found a note instead of them. It turned out that his smart roommate hid the flakes in one of n boxes. The boxes stand in one row, they are numbered from 1 to n from the left to the right. The roommate left hints like "Hidden to the left of the i-th box" ("`To the left of` i"), "Hidden to the right of the i-th box" ("`To the right of` i"). Such hints mean that there are no flakes in the i-th box as well. The Cereal Guy wants to know the minimal number of boxes he necessarily needs to check to find the flakes considering all the hints. Or he wants to find out that the hints are contradictory and the roommate lied to him, that is, no box has the flakes.

Input

The first line contains two integers n and m ($1 \le n \le 1000, 0 \le m \le 1000$) which represent the number of boxes and the number of hints correspondingly. Next m lines contain hints like "`To the left of` i" and "`To the right of` i", where i is integer ($1 \le i \le n$). The hints may coincide.

Output

The answer should contain exactly one integer — the number of boxes that should necessarily be checked or "`-1`" if the hints are contradictory.

Examples

input
2 1 To the left of 2
output
1

input
3 2 To the right of 1 To the right of 2
output
1

input
3 1 To the left of 3
output
2

input
3 2 To the left of 2 To the right of 1
output
-1

B. Serial Time!

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

The Cereal Guy's friend Serial Guy likes to watch soap operas. An episode is about to start, and he hasn't washed his plate yet. But he decided to at least put in under the tap to be filled with water. The plate can be represented by a parallelepiped $k \times n \times m$, that is, it has k layers (the first layer is the upper one), each of which is a rectangle $n \times m$ with empty squares ('.') and obstacles ('#'). The water can only be present in the empty squares. The tap is positioned above the square (x, y) of the first layer, it is guaranteed that this square is empty. Every minute a cubical unit of water falls into the plate. Find out in how many minutes the Serial Guy should unglue himself from the soap opera and turn the water off for it not to overfill the plate. That is, you should find the moment of time when the plate is absolutely full and is going to be overfilled in the next moment.

Note: the water fills all the area within reach (see sample 4). Water flows in **each** of the 6 directions, through faces of $1 \times 1 \times 1$ cubes.

Input

The first line contains three numbers k, n, m ($1 \le k, n, m \le 10$) which are the sizes of the plate. Then follow k rectangles consisting of n lines each containing m characters '.' or '#', which represents the "layers" of the plate in the order from the top to the bottom. The rectangles are separated by empty lines (see the samples). The last line contains x and y ($1 \le x \le n, 1 \le y \le m$) which are the tap's coordinates. x is the number of the line and y is the number of the column. Lines of each layer are numbered from left to right by the integers from 1 to n, columns of each layer are numbered from top to bottom by the integers from 1 to m.

Output

The answer should contain a single number, showing in how many minutes the plate will be filled.

Examples

input
1 1 1 . 1 1
output
1

input
2 1 1 . # 1 1
output
1

input
2 2 2 .# ## 1 1
output
5

input
3 2 2 #. ## #. .#

```
..
..

1 2
```

output

```
7
```

input

```
3 3 3

.#.
###
##.

.##
###
##.

...
...
...

1 1
```

output

```
13
```

C. Mushroom Strife

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

Pasha and Akim were making a forest map — the lawns were the graph's vertexes and the roads joining the lawns were its edges. They decided to encode the number of laughy mushrooms on every lawn in the following way: on every edge between two lawns they wrote two numbers, the greatest common divisor (GCD) and the least common multiple (LCM) of the number of mushrooms on these lawns. But one day Pasha and Akim had an argument about the laughy mushrooms and tore the map. Pasha was left with just some part of it, containing only m roads. Your task is to help Pasha — use the map he has to restore the number of mushrooms on every lawn. As the result is not necessarily unique, help Pasha to restore any one or report that such arrangement of mushrooms does not exist. It is guaranteed that the numbers on the roads on the initial map were no less that 1 and did not exceed 10^6.

Input

The first line contains two numbers n and m ($1 \le n \le 100, 0 \le m \le \frac{n \cdot (n-1)}{2}$) which are the numbers of lawns and roads we know about. Each of the following m lines contains four numbers which are the numbers of lawns the road connects, the GCD and the LCM of the numbers of mushrooms on these lawns ($1 \le GCD, LCM \le 10^6$).

It is guaranteed, that no road connects lawn to itself, and no two lawns are connected by more than one road.

Output

The answer should contain "YES" or "NO" on the first line, saying whether it is possible or not to perform the arrangement. If the answer is "YES", print on the following line n numbers which are the numbers of mushrooms on the corresponding lawns.

Examples

input
1 0
output
YES 1

input
2 1 1 2 1 3
output
YES 1 3

input
3 2 3 2 1 2 3 1 1 10
output
YES 5 1 2

input
2 1 1 2 3 7
output
NO

D. Savior

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

Misha decided to help Pasha and Akim be friends again. He had a cunning plan — to destroy all the laughy mushrooms. He knows that the laughy mushrooms can easily burst when they laugh. Mushrooms grow on the lawns. There are $a[t]$ mushrooms on the t-th lawn.

Misha knows that the lawns where the mushrooms grow have a unique ability. A lawn (say, i) can transfer laugh to other lawn (say, j) if there exists an integer (say, b) such, that some permutation of numbers $a[i]$, $a[j]$ and b is a *beautiful triple* ($i \neq j$). A beautiful triple is such three pairwise coprime numbers x, y, z, which satisfy the following condition: $x^2 + y^2 = z^2$.

Misha wants to know on which minimal number of lawns he should laugh for all the laughy mushrooms to burst.

Input

The first line contains one integer n ($1 \leq n \leq 10^6$) which is the number of lawns. The next line contains n integers a_i which are the number of mushrooms on the i-lawn ($1 \leq a_i \leq 10^7$). All the numbers are different.

Output

Print a single number — the minimal number of lawns on which Misha should laugh for all the mushrooms to burst.

Examples

input
1 2
output
1

input
2 1 2
output
2

input
2 3 5
output
1

E. Mushroom Gnomes

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

Once upon a time in the thicket of the mushroom forest lived mushroom gnomes. They were famous among their neighbors for their magic mushrooms. Their magic nature made it possible that between every two neighboring mushrooms every minute grew another mushroom with the weight equal to the sum of weights of two neighboring ones.

The mushroom gnomes loved it when everything was in order, that's why they always planted the mushrooms in one line in the order of their weights' increasing. Well... The gnomes planted the mushrooms and went to eat. After x minutes they returned and saw that new mushrooms had grown up, so that the increasing order had been violated. The gnomes replanted all the mushrooms in the correct order, that is, they sorted the mushrooms in the order of the weights' increasing. And went to eat again (those gnomes were quite big eaters). What total weights modulo p will the mushrooms have in another y minutes?

Input

The first line contains four integers n, x, y, p ($1 \le n \le 10^6, 0 \le x, y \le 10^{18}, x + y > 0, 2 \le p \le 10^9$) which represent the number of mushrooms, the number of minutes after the first replanting, the number of minutes after the second replanting and the module. The next line contains n integers a_i which represent the mushrooms' weight in the non-decreasing order ($0 \le a_i \le 10^9$).

Please, do not use `%lld` specificator to read or write 64-bit integers in C++. It is preffered to use `cin` (also you may use `%I64d`).

Output

The answer should contain a single number which is the total weights of the mushrooms modulo p in the end after $x + y$ minutes.

Examples

input
2 1 0 657276545 1 2
output
6

input
2 1 1 888450282 1 2
output
14

input
4 5 0 10000 1 2 3 4
output
1825