Codeforces Round #395 (Div. 2)

A. Taymyr is calling you

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

Comrade Dujikov is busy choosing artists for Timofey's birthday and is recieving calls from Taymyr from Ilia-alpinist.

Ilia-alpinist calls every n minutes, i.e. in minutes $n, 2n, 3n$ and so on. Artists come to the comrade every m minutes, i.e. in minutes $m, 2m, 3m$ and so on. The day is z minutes long, i.e. the day consists of minutes $1, 2, ..., z$. How many artists should be killed so that there are no artists in the room when Ilia calls? Consider that a call and a talk with an artist take exactly one minute.

Input
The only string contains three integers — n, m and z ($1 \le n, m, z \le 10^4$).

Output
Print single integer — the minimum number of artists that should be killed so that there are no artists in the room when Ilia calls.

Examples

input
1 1 10
output
10

input
1 2 5
output
2

input
2 3 9
output
1

Note
Taymyr is a place in the north of Russia.

In the first test the artists come each minute, as well as the calls, so we need to kill all of them.

In the second test we need to kill artists which come on the second and the fourth minutes.

In the third test — only the artist which comes on the sixth minute.

B. Timofey and cubes

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

Young Timofey has a birthday today! He got kit of n cubes as a birthday present from his parents. Every cube has a number a_i, which is written on it. Timofey put all the cubes in a row and went to unpack other presents.

In this time, Timofey's elder brother, Dima reordered the cubes using the following rule. Suppose the cubes are numbered from 1 to n in their order. Dima performs several steps, on step i he reverses the segment of cubes from i-th to $(n - i + 1)$-th. He does this while $i \leq n - i + 1$.

After performing the operations Dima went away, being very proud of himself. When Timofey returned to his cubes, he understood that their order was changed. Help Timofey as fast as you can and save the holiday — restore the initial order of the cubes using information of their current location.

Input

The first line contains single integer n ($1 \leq n \leq 2 \cdot 10^5$) — the number of cubes.

The second line contains n integers $a_1, a_2, ..., a_n$ ($-10^9 \leq a_i \leq 10^9$), where a_i is the number written on the i-th cube after Dima has changed their order.

Output

Print n integers, separated by spaces — the numbers written on the cubes in their initial order.

It can be shown that the answer is unique.

Examples

input
7 4 3 7 6 9 1 2
output
2 3 9 6 7 1 4

input
8 6 1 4 2 5 6 9 2
output
2 1 6 2 5 4 9 6

Note

Consider the first sample.

1. At the begining row was [2, 3, 9, 6, 7, 1, 4].
2. After first operation row was [4, 1, 7, 6, 9, 3, 2].
3. After second operation row was [4, 3, 9, 6, 7, 1, 2].
4. After third operation row was [4, 3, 7, 6, 9, 1, 2].
5. At fourth operation we reverse just middle element, so nothing has changed. The final row is [4, 3, 7, 6, 9, 1, 2]. So the answer for this case is row [2, 3, 9, 6, 7, 1, 4].

C. Timofey and a tree

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

Each New Year Timofey and his friends cut down a tree of n vertices and bring it home. After that they paint all the n its vertices, so that the i-th vertex gets color c_i.

Now it's time for Timofey birthday, and his mother asked him to remove the tree. Timofey removes the tree in the following way: he takes some vertex in hands, while all the other vertices move down so that the tree becomes rooted at the chosen vertex. After that Timofey brings the tree to a trash can.

Timofey doesn't like it when many colors are mixing together. A subtree annoys him if there are vertices of different color in it. Timofey wants to find a vertex which he should take in hands so that there are no subtrees that annoy him. He doesn't consider the whole tree as a subtree since he can't see the color of the root vertex.

A subtree of some vertex is a subgraph containing that vertex and all its descendants.

Your task is to determine if there is a vertex, taking which in hands Timofey wouldn't be annoyed.

Input

The first line contains single integer n ($2 \le n \le 10^5$) — the number of vertices in the tree.

Each of the next n - 1 lines contains two integers u and v ($1 \le u, v \le n, u \ne v$), denoting there is an edge between vertices u and v. It is guaranteed that the given graph is a tree.

The next line contains n integers $c_1, c_2, ..., c_n$ ($1 \le c_i \le 10^5$), denoting the colors of the vertices.

Output

Print "NO" in a single line, if Timofey can't take the tree in such a way that it doesn't annoy him.

Otherwise print "YES" in the first line. In the second line print the index of the vertex which Timofey should take in hands. If there are multiple answers, print any of them.

Examples

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

input
3 1 2 2 3 1 2 3
output
YES 2

input
4 1 2 2 3 3 4 1 2 1 2
output
NO

D. Timofey and rectangles

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

One of Timofey's birthday presents is a colourbook in a shape of an infinite plane. On the plane n rectangles with sides parallel to coordinate axes are situated. All sides of the rectangles have **odd** length. Rectangles cannot intersect, but they can touch each other.

Help Timofey to color his rectangles in 4 different colors in such a way that every two rectangles touching each other by side would have different color, or determine that it is impossible.

Two rectangles intersect if their intersection has positive area. Two rectangles touch by sides if there is a pair of sides such that their intersection has non-zero length

The picture corresponds to the first example

Input

The first line contains single integer n ($1 \le n \le 5 \cdot 10^5$) — the number of rectangles.

n lines follow. The i-th of these lines contains four integers x_1, y_1, x_2 and y_2 ($-10^9 \le x_1 < x_2 \le 10^9$, $-10^9 \le y_1 < y_2 \le 10^9$), that means that points (x_1, y_1) and (x_2, y_2) are the coordinates of two opposite corners of the i-th rectangle.

It is guaranteed, that all sides of the rectangles have **odd** lengths and rectangles don't intersect each other.

Output

Print "NO" in the only line if it is impossible to color the rectangles in 4 different colors in such a way that every two rectangles touching each other by side would have different color.

Otherwise, print "YES" in the first line. Then print n lines, in the i-th of them print single integer c_i ($1 \le c_i \le 4$) — the color of i-th rectangle.

Example

input
8 0 0 5 3 2 -1 5 0 -3 -4 2 -1 -1 -1 2 0 -3 0 0 5 5 2 10 3 7 -3 10 2 4 -2 7 -1

output
YES 1 2 2 3 2 2 4 1

E. Timofey and remoduling

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

Little Timofey likes integers a lot. Unfortunately, he is very young and can't work with very big integers, so he does all the operations modulo his favorite prime m. Also, Timofey likes to look for arithmetical progressions everywhere.

One of his birthday presents was a sequence of **distinct** integers $a_1, a_2, ..., a_n$. Timofey wants to know whether he can rearrange the elements of the sequence so that is will be an arithmetical progression modulo m, or not.

Arithmetical progression modulo m of length n with first element x and difference d is sequence of integers $x, x + d, x + 2d, ..., x + (n - 1)\cdot d$, each taken modulo m.

Input

The first line contains two integers m and n ($2 \le m \le 10^9 + 7$, $1 \le n \le 10^5$, m is prime) — Timofey's favorite prime module and the length of the sequence.

The second line contains n **distinct** integers $a_1, a_2, ..., a_n$ ($0 \le a_i < m$) — the elements of the sequence.

Output

Print -1 if it is not possible to rearrange the elements of the sequence so that is will be an arithmetical progression modulo m.

Otherwise, print two integers — the first element of the obtained progression x ($0 \le x < m$) and its difference d ($0 \le d < m$).

If there are multiple answers, print any of them.

Examples

input
17 5 0 2 4 13 15
output
13 2

input
17 5 0 2 4 13 14
output
-1

input
5 3 1 2 3
output
3 4