Codeforces Round #450 (Div. 2)

A. Find Extra One

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

You have n distinct points on a plane, none of them lie on OY axis. Check that there is a point after removal of which the remaining points are located on one side of the OY axis.

Input

The first line contains a single positive integer n ($2 \le n \le 10^5$).

The following n lines contain coordinates of the points. The i-th of these lines contains two single integers x_i and y_i ($|x_i|, |y_i| \le 10^9, x_i \neq 0$). No two points coincide.

Output

Print "Yes" if there is such a point, "No" — otherwise.

You can print every letter in any case (upper or lower).

Examples

input
3 1 1 -1 -1 2 -1
output
Yes

input
4 1 1 2 2 -1 1 -2 2
output
No

input
3 1 2 2 1 4 60
output
Yes

Note

In the first example the second point can be removed.

In the second example there is no suitable for the condition point.

In the third example any point can be removed.

B. Position in Fraction

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

You have a fraction $\frac{a}{b}$. You need to find the first occurrence of digit c into decimal notation of the fraction after decimal point.

Input

The first contains three single positive integers a, b, c ($1 \le a < b \le 10^5$, $0 \le c \le 9$).

Output

Print position of the first occurrence of digit c into the fraction. Positions are numbered from 1 after decimal point. It there is no such position, print -1.

Examples

input
1 2 0

output
2

input
2 3 7

output
-1

Note

The fraction in the first example has the following decimal notation: $\frac{1}{2} = 0.500(0)$. The first zero stands on second position.

The fraction in the second example has the following decimal notation: $\frac{2}{3} = 0.666(6)$. There is no digit 7 in decimal notation of the fraction.

C. Remove Extra One

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

You are given a permutation p of length n. Remove one element from permutation to make the number of records the maximum possible.

We remind that in a sequence of numbers $a_1, a_2, \ldots, a_k$ the element a_i is a *record* if for every integer j $(1 \le j < i)$ the following holds: $a_j < a_i$.

Input

The first line contains the only integer n $(1 \le n \le 10^5)$ — the length of the permutation.

The second line contains n integers $p_1, p_2, \ldots, p_n$ $(1 \le p_i \le n)$ — the permutation. All the integers are distinct.

Output

Print the only integer — the element that should be removed to make the number of records the maximum possible. If there are multiple such elements, print the smallest one.

Examples

input
1 1
output
1

input
5 5 1 2 3 4
output
5

Note

In the first example the only element can be removed.

D. Unusual Sequences

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

Count the number of distinct sequences $a_1, a_2, \ldots, a_n$ $(1 \le a_i)$ consisting of positive integers such that $gcd(a_1, a_2, \ldots, a_n) = x$ and $\sum_{i=1}^{n} a_i = y$. As this number could be large, print the answer modulo $10^9 + 7$.

gcd here means the greatest common divisor.

Input

The only line contains two positive integers x and y $(1 \le x, y \le 10^9)$.

Output

Print the number of such sequences modulo $10^9 + 7$.

Examples

input
3 9
output
3

input
5 8
output
0

Note

There are three suitable sequences in the first test: $(3, 3, 3)$, $(3, 6)$, $(6, 3)$.

There are no suitable sequences in the second test.

E. Maximum Questions

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

Vasya wrote down two strings s of length n and t of length m consisting of small English letters 'a' and 'b'. What is more, he knows that string t has a form "abab...", namely there are letters 'a' on odd positions and letters 'b' on even positions.

Suddenly in the morning, Vasya found that somebody spoiled his string. Some letters of the string s were replaced by character '?'.

Let's call a sequence of positions $i, i + 1, ..., i + m - 1$ as *occurrence* of string t in s, if $1 \le i \le n - m + 1$ and $t_1 = s_i, t_2 = s_{i+1}, ..., t_m = s_{i+m-1}$.

The boy defines the *beauty* of the string s as maximum number of disjoint occurrences of string t in s. Vasya can replace some letters '?' with 'a' or 'b' (letters on different positions can be replaced with different letter). Vasya wants to make some replacements in such a way that beauty of string s is maximum possible. From all such options, he wants to choose one with the minimum number of replacements. Find the number of replacements he should make.

Input

The first line contains a single integer n ($1 \le n \le 10^5$) — the length of s.

The second line contains the string s of length n. It contains small English letters 'a', 'b' and characters '?' only.

The third line contains a single integer m ($1 \le m \le 10^5$) — the length of t. The string t contains letters 'a' on odd positions and 'b' on even positions.

Output

Print the only integer — the minimum number of replacements Vasya has to perform to make the beauty of string s the maximum possible.

Examples

input
5 bb?a? 1
output
2

input
9 ab??ab??? 3
output
2

Note

In the first sample string t has a form 'a'. The only optimal option is to replace all characters '?' by 'a'.

In the second sample using two replacements we can make string equal to "**aba**?**aba**??". It is impossible to get more than two occurrences.