Codeforces Round #360 (Div. 2)

A. Opponents

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

Arya has n opponents in the school. Each day he will fight with all opponents who are present this day. His opponents have some fighting plan that guarantees they will win, but implementing this plan requires presence of them all. That means if one day at least one of Arya's opponents is absent at the school, then Arya will beat all present opponents. Otherwise, if all opponents are present, then they will beat Arya.

For each opponent Arya knows his schedule — whether or not he is going to present on each particular day. Tell him the maximum number of **consecutive** days that he will beat all present opponents.

Note, that if some day there are no opponents present, Arya still considers he beats all the present opponents.

Input

The first line of the input contains two integers n and d $(1 \le n, d \le 100)$ — the number of opponents and the number of days, respectively.

The i-th of the following d lines contains a string of length n consisting of characters '0' and '1'. The j-th character of this string is '0' if the j-th opponent is going to be absent on the i-th day.

Output

Print the only integer — the maximum number of consecutive days that Arya will beat all present opponents.

Examples

input
2 2 10 00
output
2

input
4 1 0100
output
1

input
4 5 1101 1111 0110 1011 1111
output
2

Note

In the first and the second samples, Arya will beat all present opponents each of the d days.

In the third sample, Arya will beat his opponents on days 1, 3 and 4 and his opponents will beat him on days 2 and 5. Thus, the maximum number of consecutive winning days is 2, which happens on days 3 and 4.

B. Lovely Palindromes

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

Pari has a friend who loves palindrome numbers. A palindrome number is a number that reads the same forward or backward. For example 12321, 100001 and 1 are palindrome numbers, while 112 and 1021 are not.

Pari is trying to love them too, but only very special and gifted people can understand the beauty behind palindrome numbers. Pari loves integers with even length (i.e. the numbers with even number of digits), so she tries to see a lot of big palindrome numbers with even length (like a 2-digit 11 or 6-digit 122221), so maybe she could see something in them.

Now Pari asks you to write a program that gets a huge integer n from the input and tells what is the n-th even-length positive palindrome number?

Input

The only line of the input contains a single integer n ($1 \le n \le 10^{100\,000}$).

Output

Print the n-th even-length palindrome number.

Examples

input
1
output
11

input
10
output
1001

Note

The first 10 even-length palindrome numbers are $11, 22, 33, \ldots, 88, 99$ and 1001.

C. NP-Hard Problem

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

Recently, Pari and Arya did some research about NP-Hard problems and they found the *minimum vertex cover* problem very interesting.

Suppose the graph G is given. Subset A of its vertices is called a *vertex cover* of this graph, if for each edge uv there is at least one endpoint of it in this set, i.e. or (or both).

Pari and Arya have won a great undirected graph as an award in a team contest. Now they have to split it in two parts, but both of them want their parts of the graph to be a vertex cover.

They have agreed to give you their graph and you need to find two **disjoint** subsets of its vertices A and B, such that both A and B are vertex cover or claim it's impossible. Each vertex should be given to no more than one of the friends (or you can even keep it for yourself).

Input

The first line of the input contains two integers n and m ($2 \le n \le 100\,000$, $1 \le m \le 100\,000$) — the number of vertices and the number of edges in the prize graph, respectively.

Each of the next m lines contains a pair of integers u_i and v_i ($1 \le u_i, v_i \le n$), denoting an undirected edge between u_i and v_i. It's guaranteed the graph won't contain any self-loops or multiple edges.

Output

If it's impossible to split the graph between Pari and Arya as they expect, print "`-1`" (without quotes).

If there are two disjoint sets of vertices, such that both sets are vertex cover, print their descriptions. Each description must contain two lines. The first line contains a single integer k denoting the number of vertices in that vertex cover, and the second line contains k integers — the indices of vertices. Note that because of $m \ge 1$, vertex cover cannot be empty.

Examples

input
4 2 1 2 2 3

output
1 2 2 1 3

input
3 3 1 2 2 3 1 3

output
-1

Note

In the first sample, you can give the vertex number 2 to Arya and vertices numbered 1 and 3 to Pari and keep vertex number 4 for yourself (or give it someone, if you wish).

In the second sample, there is no way to satisfy both Pari and Arya.

D. Remainders Game

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

Today Pari and Arya are playing a game called Remainders.

Pari chooses two positive integer x and k, and tells Arya k but not x. Arya have to find the value . There are n ancient numbers $c_1, c_2, ..., c_n$ and Pari has to tell Arya if Arya wants. Given k and the ancient values, tell us if Arya has a winning strategy independent of value of x or not. Formally, is it true that Arya can understand the value for any positive integer x?

Note, that means the remainder of x after dividing it by y.

Input

The first line of the input contains two integers n and k ($1 \le n,\ k \le 1\,000\,000$) — the number of ancient integers and value k that is chosen by Pari.

The second line contains n integers $c_1, c_2, ..., c_n$ ($1 \le c_i \le 1\,000\,000$).

Output

Print "Yes" (without quotes) if Arya has a winning strategy independent of value of x, or "No" (without quotes) otherwise.

Examples

input
4 5 2 3 5 12
output
Yes

input
2 7 2 3
output
No

Note

In the first sample, Arya can understand because 5 is one of the ancient numbers.

In the second sample, Arya can't be sure what is. For example 1 and 7 have the same remainders after dividing by 2 and 3, but they differ in remainders after dividing by 7.

E. The Values You Can Make

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

Pari wants to buy an expensive chocolate from Arya. She has n coins, the value of the i-th coin is c_i. The price of the chocolate is k, so Pari will take a subset of her coins with sum equal to k and give it to Arya.

Looking at her coins, a question came to her mind: after giving the coins to Arya, what values does Arya can make with them? She is jealous and she doesn't want Arya to make a lot of values. So she wants to know all the values x, such that Arya will be able to make x using some subset of coins with the sum k.

Formally, Pari wants to know the values x such that there exists a subset of coins with the sum k such that some subset of this subset has the sum x, i.e. there is exists some way to pay for the chocolate, such that Arya will be able to make the sum x using these coins.

Input

The first line contains two integers n and k $(1 \le n, k \le 500)$ — the number of coins and the price of the chocolate, respectively.

Next line will contain n integers $c_1, c_2, ..., c_n$ $(1 \le c_i \le 500)$ — the values of Pari's coins.

It's guaranteed that one can make value k using these coins.

Output

First line of the output must contain a single integer q— the number of suitable values x. Then print q integers in ascending order — the values that Arya can make for some subset of coins of Pari that pays for the chocolate.

Examples

input
6 18 5 6 1 10 12 2
output
16 0 1 2 3 5 6 7 8 10 11 12 13 15 16 17 18

input
3 50 25 25 50
output
3 0 25 50

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