Codeforces Round #209 (Div. 2)

A. Table

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

Simon has a rectangular table consisting of n rows and m columns. Simon numbered the rows of the table from top to bottom starting from one and the columns — from left to right starting from one. We'll represent the cell on the x-th row and the y-th column as a pair of numbers (x, y). The table corners are cells: $(1, 1)$, $(n, 1)$, $(1, m)$, (n, m).

Simon thinks that some cells in this table are *good*. Besides, it's known that no good cell is the corner of the table.

Initially, all cells of the table are colorless. Simon wants to color all cells of his table. In one move, he can choose any good cell of table (x_1, y_1), an arbitrary corner of the table (x_2, y_2) and color all cells of the table (p, q), which meet both inequations: $min(x_1, x_2) \le p \le max(x_1, x_2)$, $min(y_1, y_2) \le q \le max(y_1, y_2)$.

Help Simon! Find the minimum number of operations needed to color all cells of the table. Note that you can color one cell multiple times.

Input

The first line contains exactly two integers n, m ($3 \le n, m \le 50$).

Next n lines contain the description of the table cells. Specifically, the i-th line contains m space-separated integers $a_{i1}, a_{i2}, \dots, a_{im}$. If a_{ij} equals zero, then cell (i, j) isn't good. Otherwise a_{ij} equals one. It is guaranteed that at least one cell is good. It is guaranteed that no good cell is a corner.

Output

Print a single number — the minimum number of operations Simon needs to carry out his idea.

Examples

input

```
3 3
0 0 0
0 1 0
0 0 0
```

output

```
4
```

input

```
4 3
0 0 0
0 0 1
1 0 0
0 0 0
```

output

```
2
```

Note

In the first sample, the sequence of operations can be like this:

- For the first time you need to choose cell $(2, 2)$ and corner $(1, 1)$.
- For the second time you need to choose cell $(2, 2)$ and corner $(3, 3)$.
- For the third time you need to choose cell $(2, 2)$ and corner $(3, 1)$.
- For the fourth time you need to choose cell $(2, 2)$ and corner $(1, 3)$.

In the second sample the sequence of operations can be like this:

- For the first time you need to choose cell $(3, 1)$ and corner $(4, 3)$.
- For the second time you need to choose cell $(2, 3)$ and corner $(1, 1)$.

B. Permutation

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

A *permutation* p is an ordered group of numbers $p_1, p_2, \ldots, p_n$, consisting of n distinct positive integers, each is no more than n. We'll define number n as the length of permutation $p_1, p_2, \ldots, p_n$.

Simon has a positive integer n and a non-negative integer k, such that $2k \le n$. Help him find permutation a of length $2n$, such that it meets this equation: $\sum_{i=1}^{n} |a_{2i-1} - a_{2i}| - |\sum_{i=1}^{n} a_{2i-1} - a_{2i}| = 2k$.

Input

The first line contains two integers n and k ($1 \le n \le 50000$, $0 \le 2k \le n$).

Output

Print $2n$ integers $a_1, a_2, \ldots, a_{2n}$ — the required permutation a. It is guaranteed that the solution exists. If there are multiple solutions, you can print any of them.

Examples

input
```
1 0
```
output
```
1 2
```

input
```
2 1
```
output
```
3 2 1 4
```

input
```
4 0
```
output
```
2 7 4 6 1 3 5 8
```

Note

Record $|x|$ represents the absolute value of number x.

In the first sample $|1 - 2| - |1 - 2| = 0$.

In the second sample $|3 - 2| + |1 - 4| - |3 - 2 + 1 - 4| = 1 + 3 - 2 = 2$.

In the third sample $|2 - 7| + |4 - 6| + |1 - 3| + |5 - 8| - |2 - 7 + 4 - 6 + 1 - 3 + 5 - 8| = 12 - 12 = 0$.

C. Prime Number

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

Simon has a prime number x and an array of non-negative integers $a_1, a_2, \ldots, a_n$.

Simon loves fractions very much. Today he wrote out number $\frac{1}{x^{a_1}} + \frac{1}{x^{a_2}} + \ldots + \frac{1}{x^{a_n}}$ on a piece of paper. After Simon led all fractions to a common denominator and summed them up, he got a fraction: $\frac{s}{t}$, where number t equals $x^{a_1 + a_2 + \ldots + a_n}$. Now Simon wants to reduce the resulting fraction.

Help him, find the greatest common divisor of numbers s and t. As GCD can be rather large, print it as a remainder after dividing it by number 1000000007 ($10^9 + 7$).

Input

The first line contains two positive integers n and x ($1 \le n \le 10^5$, $2 \le x \le 10^9$) — the size of the array and the prime number.

The second line contains n space-separated integers $a_1, a_2, \ldots, a_n$ ($0 \le a_1 \le a_2 \le \ldots \le a_n \le 10^9$).

Output

Print a single number — the answer to the problem modulo 1000000007 ($10^9 + 7$).

Examples

input
```
2 2
2 2
```
output
```
8
```

input
```
3 3
1 2 3
```
output
```
27
```

input
```
2 2
29 29
```
output
```
73741817
```

input
```
4 5
0 0 0 0
```
output
```
1
```

Note

In the first sample $\frac{1}{4} + \frac{1}{4} = \frac{4+4}{16} = \frac{8}{16}$. Thus, the answer to the problem is 8.

In the second sample, $\frac{1}{3} + \frac{1}{9} + \frac{1}{27} = \frac{243+81+27}{729} = \frac{351}{729}$. The answer to the problem is 27, as $351 = 13 \cdot 27$, $729 = 27 \cdot 27$.

In the third sample the answer to the problem is $1073741824 \; mod \; 1000000007 = 73741817$.

In the fourth sample $\frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} = \frac{4}{1}$. Thus, the answer to the problem is 1.

D. Pair of Numbers

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

Simon has an array $a_1, a_2, \ldots, a_n$, consisting of n positive integers. Today Simon asked you to find a pair of integers l, r $(1 \le l \le r \le n)$, such that the following conditions hold:

1. there is integer j ($l \le j \le r$), such that all integers $a_l, a_{l+1}, \ldots, a_r$ are divisible by a_j;
2. value $r - l$ takes the maximum value among all pairs for which condition 1 is true;

Help Simon, find the required pair of numbers (l, r). If there are multiple required pairs find all of them.

Input

The first line contains integer n ($1 \le n \le 3 \cdot 10^5$).

The second line contains n space-separated integers $a_1, a_2, \ldots, a_n$ $(1 \le a_i \le 10^6)$.

Output

Print two integers in the first line — the number of required pairs and the maximum value of $r - l$. On the following line print all l values from optimal pairs in increasing order.

Examples

input

```
5
4 6 9 3 6
```

output

```
1 3
2
```

input

```
5
1 3 5 7 9
```

output

```
1 4
1
```

input

```
5
2 3 5 7 11
```

output

```
5 0
1 2 3 4 5
```

Note

In the first sample the pair of numbers is right, as numbers $6, 9, 3$ are divisible by 3.

In the second sample all numbers are divisible by number 1.

In the third sample all numbers are prime, so conditions 1 and 2 are true only for pairs of numbers $(1, 1)$, $(2, 2)$, $(3, 3)$, $(4, 4)$, $(5, 5)$.

E. Neatness

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

Simon loves neatness. So before he goes to bed, Simon wants to complete all chores in the house.

Simon's house looks like a rectangular table consisting of n rows and n columns from above. All rows of the table are numbered from 1 to n from top to bottom. All columns of the table are numbered from 1 to n from left to right. Each cell of the table is a room. Pair (x, y) denotes the room, located at the intersection of the x-th row and the y-th column. For each room we know if the light is on or not there.

Initially Simon is in room (x_0, y_0). He wants to turn off the lights in all the rooms in the house, and then return to room (x_0, y_0). Suppose that at the current moment Simon is in the room (x, y). To reach the desired result, he can perform the following steps:

1. The format of the action is "1". The action is to turn on the light in room (x, y). Simon cannot do it if the room already has light on.
2. The format of the action is "2". The action is to turn off the light in room (x, y). Simon cannot do it if the room already has light off.
3. The format of the action is "dir" (dir is a character). The action is to move to a side-adjacent room in direction dir. The direction can be left, right, up or down (the corresponding dir is L, R, U or D). Additionally, Simon can move only if he see a light in the direction dir. More formally, if we represent the room, Simon wants to go, as (nx, ny), there shold be an integer k $(k > 0)$, that room $(x + (nx - x)k, y + (ny - y)k)$ has a light. Of course, Simon cannot move out of his house.

Help Simon, find the sequence of actions that lets him achieve the desired result.

Input

The first line contains three positive integers n, x_0, y_0 $(2 \le n \le 500, 1 \le x_0, y_0 \le n)$.

Next n lines contain the description of rooms in the house. The i-th line contains n space-separated integers $a_{i1}, a_{i2}, \dots, a_{in}$. If number a_{ij} equals zero, then room (i, j) has light off, and if number a_{ij} equals one, then room (i, j) has light on. It is guaranteed that at least one room has light on.

Output

If there is no desired sequence of actions, print "NO" (without the quotes). Otherwise, print "YES" (without the quotes) and the description of the required sequence of actions as a string. Note that you do not have to minimize the length of the sequence of actions but you shouldn't use more than $3 \cdot 10^6$ actions.

Examples

input
```
3 1 1
1 0 0
0 1 0
1 0 0
```
output
```
YES
D1R2L2D2UU2
```

input
```
3 1 1
1 0 0
0 1 0
0 0 1
```
output
```
NO
```