A. Dividing Orange

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

One day Ms Swan bought an orange in a shop. The orange consisted of $n \cdot k$ segments, numbered with integers from 1 to $n \cdot k$.

There were k children waiting for Ms Swan at home. The children have recently learned about the orange and they decided to divide it between them. For that each child took a piece of paper and wrote the number of the segment that he would like to get: the i-th $(1 \le i \le k)$ child wrote the number a_i $(1 \le a_i \le n \cdot k)$. All numbers a_i accidentally turned out to be different.

Now the children wonder, how to divide the orange so as to meet these conditions:

- each child gets exactly n orange segments;
- the i-th child gets the segment with number a_i for sure;
- no segment goes to two children simultaneously.

Help the children, divide the orange and fulfill the requirements, described above.

Input

The first line contains two integers n, k $(1 \le n, k \le 30)$. The second line contains k space-separated integers $a_1, a_2, ..., a_k$ $(1 \le a_i \le n \cdot k)$, where a_i is the number of the orange segment that the i-th child would like to get.

It is guaranteed that all numbers a_i are distinct.

Output

Print exactly $n \cdot k$ distinct integers. The first n integers represent the indexes of the segments the first child will get, the second n integers represent the indexes of the segments the second child will get, and so on. Separate the printed numbers with whitespaces.

You can print a child's segment indexes in any order. It is guaranteed that the answer always exists. If there are multiple correct answers, print any of them.

Sample test(s)

input

```
2 2
4 1
```

output

```
2 4
1 3
```

input

```
3 1
2
```

output

```
3 2 1
```

B. Undoubtedly Lucky Numbers

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

Polycarpus loves lucky numbers. Everybody knows that lucky numbers are positive integers, whose decimal representation (without leading zeroes) contain only the lucky digits x and y. For example, if $x = 4$, and $y = 7$, then numbers 47, 744, 4 are lucky.

Let's call a positive integer a *undoubtedly lucky*, if there are such digits x and y $(0 \le x, y \le 9)$, that the decimal representation of number a (without leading zeroes) contains only digits x and y.

Polycarpus has integer n. He wants to know how many positive integers that do not exceed n, are undoubtedly lucky. Help him, count this number.

Input

The first line contains a single integer n $(1 \le n \le 10^9)$ — Polycarpus's number.

Output

Print a single integer that says, how many positive integers that do not exceed n are undoubtedly lucky.

Sample test(s)

input

```
10
```

output

```
10
```

input

```
123
```

output

```
113
```

Note

In the first test sample all numbers that do not exceed 10 are undoubtedly lucky.

In the second sample numbers 102, 103, 104, 105, 106, 107, 108, 109, 120, 123 are not undoubtedly lucky.

C. The Brand New Function

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

Polycarpus has a sequence, consisting of n non-negative integers: $a_1, a_2, \dots, a_n$.

Let's define function $f(l, r)$ (l, r are integer, $1 \le l \le r \le n$) for sequence a as an operation of bitwise OR of all the sequence elements with indexes from l to r. Formally: $f(l, r) = a_l \mid a_{l+1} \mid \dots \mid a_r$.

Polycarpus took a piece of paper and wrote out the values of function $f(l, r)$ for all l, r (l, r are integer, $1 \le l \le r \le n$). Now he wants to know, how many **distinct** values he's got in the end.

Help Polycarpus, count the number of distinct values of function $f(l, r)$ for the given sequence a.

Expression $x \mid y$ means applying the operation of bitwise OR to numbers x and y. This operation exists in all modern programming languages, for example, in language *C++* and *Java* it is marked as "`|`", in *Pascal* — as "`or`".

Input

The first line contains integer n $(1 \le n \le 10^5)$ — the number of elements of sequence a. The second line contains n space-separated integers $a_1, a_2, \dots, a_n$ $(0 \le a_i \le 10^6)$ — the elements of sequence a.

Output

Print a single integer — the number of distinct values of function $f(l, r)$ for the given sequence a.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use `cin`, `cout` streams or the `%I64d` specifier.

Sample test(s)

input
```
3
1 2 0
```
output
```
4
```

input
```
10
1 2 3 4 5 6 1 2 9 10
```
output
```
11
```

Note

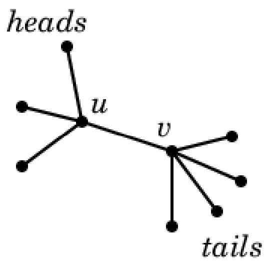
In the first test case Polycarpus will have 6 numbers written on the paper: $f(1, 1) = 1$, $f(1, 2) = 3$, $f(1, 3) = 3$, $f(2, 2) = 2$, $f(2, 3) = 2$, $f(3, 3) = 0$. There are exactly 4 distinct numbers among them: $0, 1, 2, 3$.

D. Hydra

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

One day Petya got a birthday present from his mom: a book called "The Legends and Myths of Graph Theory". From this book Petya learned about a *hydra* graph.

A non-oriented graph is a *hydra*, if it has a structure, shown on the figure below. Namely, there are two nodes u and v connected by an edge, they are the hydra's *chest* and *stomach*, correspondingly. The chest is connected with h nodes, which are the hydra's *heads*. The stomach is connected with t nodes, which are the hydra's *tails*. Note that the hydra is a tree, consisting of $h + t + 2$ nodes.



Also, Petya's got a non-directed graph G, consisting of n nodes and m edges. Petya got this graph as a last year birthday present from his mom. Graph G contains no self-loops or multiple edges.

Now Petya wants to find a hydra in graph G. Or else, to make sure that the graph doesn't have a hydra.

Input

The first line contains four integers n, m, h, t ($1 \le n, m \le 10^5$, $1 \le h, t \le 100$) — the number of nodes and edges in graph G, and the number of a hydra's heads and tails.

Next m lines contain the description of the edges of graph G. The i-th of these lines contains two integers a_i and b_i ($1 \le a_i, b_i \le n$, $a \ne b$) — the numbers of the nodes, connected by the i-th edge.

It is guaranteed that graph G contains no self-loops and multiple edges. Consider the nodes of graph G numbered with integers from 1 to n.

Output

If graph G has no hydra, print "`NO`" (without the quotes).

Otherwise, in the first line print "`YES`" (without the quotes). In the second line print two integers — the numbers of nodes u and v. In the third line print h numbers — the numbers of the nodes that are the heads. In the fourth line print t numbers — the numbers of the nodes that are the tails. All printed numbers should be distinct.

If there are multiple possible answers, you are allowed to print any of them.

Sample test(s)

input

```
9 12 2 3
1 2
2 3
1 3
1 4
2 5
4 5
4 6
6 5
6 7
7 5
8 7
9 1
```

output

```
YES
4 1
5 6
9 3 2
```

input

```
7 10 3 3
1 2
2 3
1 3
1 4
2 5
4 5
```

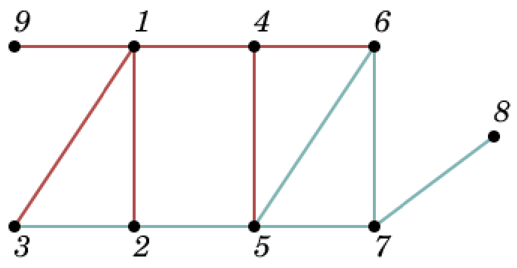
```
4 6
6 5
6 7
7 5
```

output

```
NO
```

Note

The first sample is depicted on the picture below:



E. Colorado Potato Beetle

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

Old MacDonald has a farm and a large potato field, $(10^{10} + 1) \times (10^{10} + 1)$ square meters in size. The field is divided into square garden beds, each bed takes up one square meter.

Old McDonald knows that the Colorado potato beetle is about to invade his farm and can destroy the entire harvest. To fight the insects, Old McDonald wants to spray some beds with insecticides.

So Old McDonald went to the field, stood at the center of the central field bed and sprayed this bed with insecticides. Now he's going to make a series of movements and spray a few more beds. During each movement Old McDonald moves left, right, up or down the field some integer number of meters. As Old McDonald moves, he sprays all the beds he steps on. In other words, the beds that have any intersection at all with Old McDonald's trajectory, are sprayed with insecticides.

When Old McDonald finished spraying, he wrote out all his movements on a piece of paper. Now he wants to know how many beds won't be infected after the invasion of the Colorado beetles.

It is known that the invasion of the Colorado beetles goes as follows. First some bed on the field border gets infected. Than any bed that hasn't been infected, hasn't been sprayed with insecticides and has a common side with an infected bed, gets infected as well. Help Old McDonald and determine the number of beds that won't be infected by the Colorado potato beetle.

Input

The first line contains an integer n $(1 \le n \le 1000)$ — the number of Old McDonald's movements.

Next n lines contain the description of Old McDonald's movements. The i-th of these lines describes the i-th movement. Each movement is given in the format "d_i x_i", where d_i is the character that determines the direction of the movement ("`L`", "`R`", "`U`" or "`D`" for directions "left", "right", "up" and "down", correspondingly), and x_i $(1 \le x_i \le 10^6)$ is an integer that determines the number of meters in the movement.

Output

Print a single integer — the number of beds that won't be infected by the Colorado potato beetle.

Please do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams or the `%I64d` specifier.

Sample test(s)

input

```
5
R 8
U 9
L 9
D 8
L 2
```

output

```
101
```

input

```
7
R 10
D 2
L 7
U 9
D 2
R 3
D 10
```

output

```
52
```