Lab10 - Graph2

#A - pond

Description

There is an $n \times m$ plane. `.` represents land and `W` represents water. `W` is connected to the `W` of the surrounding 8 positions. Many connected `W` form a pond. You need to count how many ponds there are.

Input

n,m

The plane formed by `.` and `W`

Output

The number of ponds.

Sample Test Data

Input #1

```
10 12
....W....WW.
WWWW.....WWW
....WW...WW.
...W.....WW.
.........W..
..W......W..
.W.W.....WW.
W.W.W...W.W.
.W.W....W.W.
..W....W..W.
```

Output #1

```
3
```

Data Limit

$2 \leq n, m \leq 100$

#B - traffic

Description

The traffic in city A is underdeveloped, and it can be represented by a directed graph. If there is a directed edge from vertex 1 to vertex 2, then you can go from area 1 to area 2, and you plan to have dinner with friends. Each area has a restaurant. There are *k* people in total, there are *n* areas in the city, you need to find how many restaurants that everyone can reach.

Input

k n m

k lines, representing which area these people are in respectively.

m lines, each line is: *a b*, representing a direct edge from area *a* to area *b*.

Sample Test Data

Input #1

```
2 4 4
2
3
1 2
1 4
2 3
3 4
```

Output #1

```
2
```

Data Limit

$2 \leq k \leq 100$

$1 \leq n \leq 1000$

$1 \leq m \leq 10000$

#C - wormholes

Description

There are *n* wormholes in a 2D plane. Two wormholes will be paired. *n* wormholes will form $n/2$ connected pairs. For example, if wormholes *A* and *B* are connected as a pair, then someone enters *A* in some direction will exit *B* in the same direction.

You need to count the number of distinct pairings of the wormholes such that there exists a position in the 2D plane so that someone starting from it always walking in the +x direction will get trapped in an infinite cycle.

Input

n

n lines, each line: (x, y) representing the coordinate of a wormhole.

Output

The number of distinct pairing that meets the condition.

Sample Test Data

Input #1

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

Output #1

```
2
```

Tips:

2 pairings:

1. (1,2), (3,4), you can start from anywhere between (0,0) and (1,0) to get trapped.
2. (1,3), (2,4), you can start from anywhere between (0,0) and (1,0) to get trapped.

Data Limit

$2 \leq N \leq 12$

The coordinate is in the range $(0, 10^9)$

#D - Topological Sorting

Description

Among the sequences *P* that are permutations of $(1, 2, \ldots, N)$ and satisfy the condition below, find the lexicographically smallest sequence.

For each $i = 1, \ldots, M$, A_i appears earlier than B_i in *P*.

If there is no such *P*, print −1.

Input

N M

A_1 B_1

.

.

.

A_M B_M

Output

P or −1.

Sample Test Data

Input #1

```
4 3
2 1
3 4
2 4
```

Output #1

```
2 1 3 4
```

Input #2

```
2 3
1 2
1 2
2 1
```

Output #2

```
-1
```

Data Limit

$2 \leq N \leq 2 \times 10^5$

$1 \leq M \leq 2 \times 10^5$

Hint

A heap may help you for lexicographical requirement.

#E - Topological Sorting

Description

We have a simple directed graph *G* with *N* vertices and *M* edges. The vertices are labeled as Vertex 1, Vertex 2, ..., Vertex *N*. The *i*-th edge $(1 \leq i \leq M)$ goes from Vertex U_i to Vertex V_i.

You will start at a vertex and repeatedly travel on *G* from one vertex to another along a directed edge. How many vertices of *G* have the following condition: you can start at that vertex and continue traveling indefinitely by carefully choosing the path?

Input

N M

M lines, each line: *U V*, representing there is a direct edge from *U* to *V*.

Output

The answer.

Sample Test Data

Input #1

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

Output #1

```
4
```

Data Limit

$2 \leq N \leq 2 \times 10^5$