

Copy Paste???

time limit per test: 1 second
memory limit per test: 976.6 megabytes
input: standard input
output: standard output
points: 100 · problem code: dijkc · author: inj

You are given an undirected graph with n nodes and m edges. What is the distance from node 1 to every other node, and how many paths with that length exist between 1 and that node?

A path has no repeating edges or nodes.

Input

The first line contains the integers n and m .

The following m lines contain integers a, b indicating an undirected edge from node a to node b .

The nodes are numbered 1 through n .

It is guaranteed that there is a path from 1 to every other node.

Output

Output $n - 1$ lines. The i -th line should contain the distance from node 1 to node $i + 1$, and the number of paths of that length between node 1 and node $i + 1$.

Constraints

- $1 \leq a, b \leq n \leq 10000$
- $1 \leq m \leq 10^5$

Example 1

Input

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

Output

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

Example 2

Input

```
10 20
1 2
2 3
3 4
4 5
5 6
6 7
7 8
8 9
9 10
10 1
8 10
4 6
3 6
9 8
4 5
6 10
8 10
8 9
1 7
4 10
```

Output

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