BFS Shortest Distances

time limit per test: 1 second (3 seconds for Python)
memory limit per test: 500 megabytes
input: standard input
output: standard output
points: 100 · problem code: bfsshortest

You are given an undirected graph with n vertices numbered from 1 to n, and a starting vertex s.

Find the minimum number of edges needed to reach every vertex from s. If a vertex cannot be reached, its distance is `-1`.

Input

The first line contains three integers n, m, and s: the number of vertices, the number of edges, and the starting vertex.

The next m lines each contain two integers a and b, meaning there is an undirected edge between vertices a and b.

Output

Print n integers: the distances from s to vertices $1, 2, ..., n$, in order. Print `-1` for each unreachable vertex.

Constraints

- $1 \leq n \leq 200000$
- $0 \leq m \leq 300000$
- $1 \leq s \leq n$
- $1 \leq a, b \leq n$

Example 1

Input

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

Output

```
0 1 1 2 3
```

Example 2

Input

```
6 2 4
2 4
5 6
```

Output

```
-1 1 -1 0 -1 -1
```

Explanation

Only vertex 2 is reachable from vertex 4 in this graph.