Problem I
Critical Road

The City of ICPC is preparing for a party for its anniversary. As the mayor of the city, you would like to hold a parade in each of the districts in the city.

The parade route can be represented as a *Directed Acyclic Graph*. There are N nodes (numbered from 1 to N) that represent the districts in the city. There are M directed edges (numbered from 1 to M) that represent the **one directional** roads. By using road j, the parade can move from district U_j to V_j, but not the other way around. It is known that all districts can be visited by the parade from the City Center, which resides in district 1.

A road is i-critical if the road is used in all paths from district 1 to district i. It is possible for a road to be i-critical for several values of i. You want to assess the number of i-critical roads for each i, as they are pivotal for the parade.

For each i that satisfies $1 \leq i \leq N$, determine the number of i-critical roads.

Input

The first line consists of two integers N M ($2 \leq N \leq 100\,000; N - 1 \leq M \leq 200\,000$).

Each of the next M lines consists of two integers U_j V_j ($1 \leq U_j, V_j \leq N$). The edges form a directed acyclic graph, and every node can be visited from node 1. Furthermore, there will be no multi-edges, i.e., there will be at most one edge that directs two nodes.

Output

Output N integers in a single line. Each of the integers represents the number of i-critical roads.

Sample Input #1

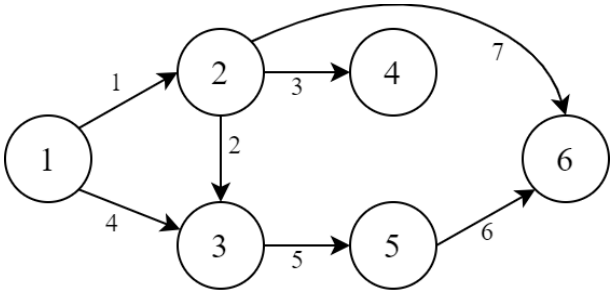
```
6 7
1 2
2 3
2 4
1 3
3 5
5 6
2 6
```

Sample Output #1

```
0 1 0 2 1 0
```

Explanation for the sample input/output #1

The following illustration depicts this sample. The numbers on the edges are the edge numbers.



It can be seen that edge 1 is 2-critical; edges 1 and 3 are 4-critical; and edge 5 is 5-critical.

Sample Input #2

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

Sample Output #2

```
0 1 2 3 4
```