

Problem D - Knives Out

Time limit: 4 seconds

“I spoke in the car about the hole at the center of this donut. And what you and Harlan did that fateful night seems at first glance to fill that hole perfectly. A donut hole in a donut’s hole. But we must look a little closer. And when we do, we see that the donut hole has a hole in its center - it is not a donut hole but a smaller donut with its own hole, and our donut is not whole at all!” – Benoit Blanc

Lucca has built the biggest donut shop in the world, with several sections inside specializing in specific donuts. Being inspired from all the mystery he’s watched in good movies recently, he decided to add a twist to his shop: it will not have doors. People can transport themselves from one section to another by using tunnels that allow them to move **in a single direction**.

Everyone hated that idea. Since it was too expensive to rebuild the tunnels, he decided to help customers by grouping some sections. Two sections will belong to the same group if, and only if, a customer can use the tunnels to move from the first section to the second, and back.

Lucca would rather spend his time watching movies, so he asked for your help in grouping the sections.

Input

The first line of input contains two integers n, m ($1 \leq n \leq 2 \cdot 10^5, 0 \leq m \leq 5 \cdot 10^5$) – the number of sections and tunnels in the shop, respectively. The next m lines each contain 2 integers u_i, v_i ($1 \leq u_i, v_i \leq n$), indicating that there is a directed edge $u_i \rightarrow v_i$.

Is is guaranteed that there is no self-loop or multiple edges in the graph formed by the tunnels.

Output

Output n integers in the range $1, \dots, n$. The i -th integer should be equal to the j -th integer if, and only if, the sections i and j are in the same group. Any valid solution will be accepted.

(See the samples for clarification.)

Sample Input

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

Sample Output

```
1 1 1
```

Sample Input

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

Sample Output

```
4 3 2 1
```

Sample Input

```
8 14
1 2
2 3
2 5
2 6
3 4
3 7
4 3
4 8
5 1
5 6
6 7
7 6
8 4
8 7
```

Sample Output

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

Note

The first sample is a directed cycle, so all sections are in the same group.

The second sample is a DAG, so all sections are in different groups.