

# Colorful Graph

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            8 seconds  
Memory limit:         64 megabytes

You are given a directed graph with  $N$  vertices and  $M$  edges. The vertices are numbered from 1 to  $N$ , and the edges are numbered from 1 to  $M$ . Edge  $i$  ( $1 \leq i \leq M$ ) goes from vertex  $A_i$  to vertex  $B_i$ .

Your task is to color each vertex of the graph with one of the colors  $1, \dots, N$  in such a way that the following conditions are satisfied:

- For each vertex  $i$  ( $1 \leq i \leq N$ ), let  $c_i$  be the color assigned to it. For any pair  $(i, j)$  ( $1 \leq i < j \leq N$ ) such that  $c_i = c_j$ , there exists a path from vertex  $i$  to vertex  $j$  or from vertex  $j$  to vertex  $i$  (or both).
- The value of  $\max\{c_1, \dots, c_N\}$  is as small as possible.

Construct one coloring that satisfies these conditions.

## Input

The input is given from Standard Input in the following format:

```
N M
A1 B1
A2 B2
⋮
AM BM
```

- All values in the input are integers.
- $1 \leq N \leq 7 \times 10^3$
- $0 \leq M \leq 7 \times 10^3$
- $1 \leq A_i, B_i \leq N$  ( $1 \leq i \leq M$ )
- $A_i \neq B_i$  ( $1 \leq i \leq M$ )
- $(A_i, B_i) \neq (A_j, B_j)$  ( $1 \leq i < j \leq M$ )

## Output

Output the color assignment  $c_1, c_2, \dots, c_N$  that satisfies these conditions.

## Examples

standard input	standard output
5 5 1 4 2 3 1 3 2 5 5 1	2 1 1 2 2
5 7 1 2 2 1 4 3 5 1 5 4 4 1 4 5	2 2 1 1 1
8 6 6 1 3 4 3 6 2 3 4 1 6 4	4 4 4 4 3 4 2 1

## Note

The memory limit for this problem is 64 MB.