IOITC 2020 TST 2

Almost shortest paths

You are given a connected undirected graph without self-loops and multiple edges with n vertices and m edges. The vertices are numbered from 1 to n.

We call the sequence $v_1, v_2, \ldots, v_k$ of vertices a path, if for each $1 \leq i \leq k-1$ there exist an edge between vertices v_i and v_{i+1}. This path is between vertices v_1 and v_k. The length of this path is equal to $k-1$. We call this path simple, if all vertices $v_1, v_2, \ldots, v_k$ are different.

Everyone knows the shortest path problem — that is, to find for each vertex u, the length of the shortest path from vertex 1 to u. Now we are looking at a variant.

We call a simple path from vertex 1 to vertex v **almost shortest** if its length is no more than one edge longer than the length of the shortest path from vertex 1 to vertex v.

For each vertex $1 \leq i \leq n$ find the number of almost shortest paths from vertex 1 to vertex i. Since this number can be too big, find it modulo $10^9 + 7$.

Input

- The first line contains two integers n, m - the number of vertices and the number of edges in the given graph.
- Each of the next m lines contains two integers u, v - the indices of vertices connected by an edge.

Output

Print n lines. On the i-th line print the number of almost shortest paths from vertex 1 to vertex i, modulo $10^9 + 7$.

Test Data

In all inputs,

- $2 \leq n \leq 5 \cdot 10^5$
- $n - 1 \leq m \leq \min\left(5 \cdot 10^5, \frac{n(n-1)}{2}\right)$
- $1 \leq u, v \leq n$
- $u \neq v$
- It is guaranteed, that all edges are different and the given graph is connected.

Subtask 1 (7 Points): $n \leq 9, m \leq 36$

Subtask 2 (41 Points): $n, m \leq 5000$

Subtask 3 (14 Points): $n = m$

Subtask 4 (38 Points): No additional constraints

Sample Input 1

```
9 13
1 2
2 3
3 1
1 4
```

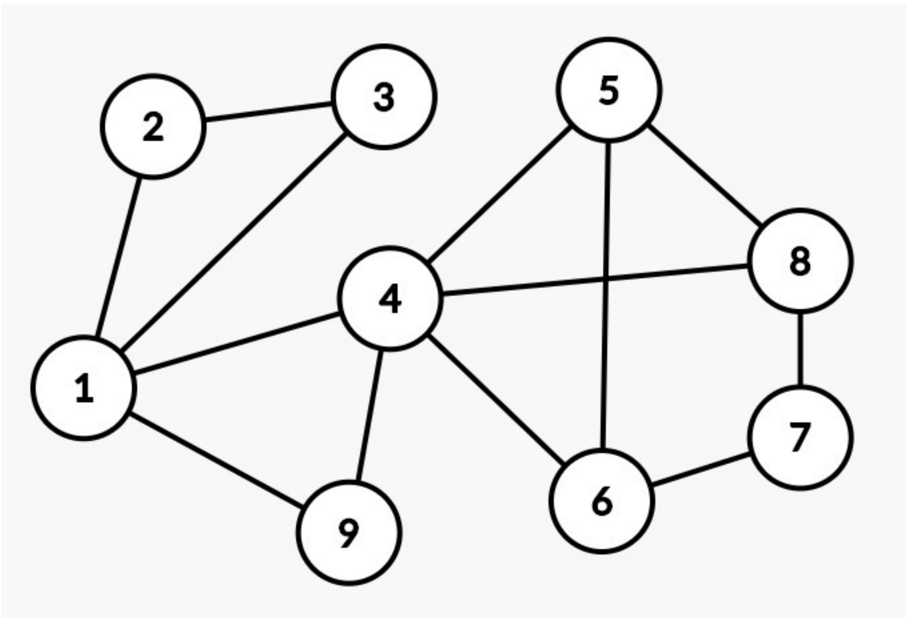
```
4 5
5 6
6 7
8 7
4 8
4 6
5 8
4 9
9 1
```

Sample Output 1

```
1
2
2
2
4
3
6
3
2
```

Explanation

The graph from the sample test:



Let's take for example the vertex 5. The length of the shortest path from vertex 1 to vertex 5 is equal to 2. There are 4 almost shortest paths from vertex 1 to vertex 5: $\{1,4,5\}$, $\{1,9,4,5\}$, $\{1,4,6,5\}$, $\{1,4,8,5\}$. So the 5th integer that we output is 4.

Limits

Time: 2 seconds

Memory: 256 MB