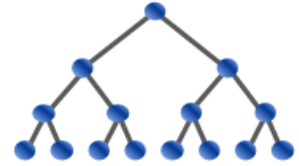


USA Computing Olympiad



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USACO 2023 DECEMBER CONTEST, PLATINUM PROBLEM 2. A GRAPH PROBLEM

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English (en) ▾

To improve her mathematical knowledge, Bessie has been taking a graph theory course and finds herself stumped by the following problem. Please help her!

You are given a connected, undirected graph with vertices labeled $1 \dots N$ and edges labeled $1 \dots M$ ($2 \leq N \leq 2 \cdot 10^5$, $N - 1 \leq M \leq 4 \cdot 10^5$). For each vertex v in the graph, the following process is conducted:

1. Let $S = \{v\}$ and $h = 0$.
2. While $|S| < N$,
 1. Out of all edges with exactly one endpoint in S , let e be the edge with the minimum label.
 2. Add the endpoint of e not in S to S .
 3. Set $h = 10h + e$.
3. Return $h \pmod{10^9 + 7}$.

Determine all the return values of this process.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains N and M . Then follow M lines, the e th containing the endpoints (a_e, b_e) of the e th edge ($1 \leq a_e < b_e \leq N$). It is guaranteed that these edges form a connected graph, and at most one edge connects each pair of vertices.

OUTPUT FORMAT (print output to the terminal / stdout):

Output N lines, where the i th line should contain the return value of the process starting at vertex i .

SAMPLE INPUT:

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

SAMPLE OUTPUT:

```
12
12
21
```

SAMPLE INPUT:

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

SAMPLE OUTPUT:

```
1325
1325
2315
2315
5132
```

Consider starting at $i = 3$. First, we choose edge 2, after which $S = \{3, 4\}$ and $h = 2$. Second, we choose edge 3, after which $S = \{2, 3, 4\}$ and $h = 23$. Third, we choose edge 1, after which $S = \{1, 2, 3, 4\}$ and $h = 231$. Finally, we choose edge 5, after which $S = \{1, 2, 3, 4, 5\}$ and $h = 2315$. The answer for $i = 3$ is therefore 2315.

SAMPLE INPUT:

15 14
1 2
2 3
3 4
4 5
5 6
6 7
7 8
8 9
9 10
10 11
11 12
12 13
13 14
14 15

SAMPLE OUTPUT:

678925929
678925929
678862929
678787329
678709839
678632097
178554320
218476543
321398766
431520989
542453212
653475435
764507558
875540761
986574081

Make sure to output the answers modulo $10^9 + 7$.

SCORING:

- Input 4: $N, M \leq 2000$
- Inputs 5-6: $N \leq 2000$
- Inputs 7-10: $N \leq 10000$
- Inputs 11-14: $a_e + 1 = b_e$ for all e
- Inputs 15-23: No additional constraints.

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.