IOITC 2020 Practice Test 4

Tree orientation

You are given a tree with N nodes numbered 1 to N. Additionally, you are also given M node pairs $(a_1, b_1), (a_2, b_2), \ldots, (a_M, b_M)$. Find the number of ways to direct the edges of the tree such that, for all i, there is a path from a_i to b_i or from b_i to a_i in the resulting directed graph.

Input

- The first line contains N, the number of nodes in the tree.

- Each of the following $N - 1$ lines contains two positive integers, the labels of the nodes connected with an edge.

- The ith of the next M lines contains the integers a_i and b_i.

Output

Print the number of ways to direct the edges as required, modulo $10^9 + 7$.

Test Data

In all inputs, $1 \le a_i, b_i \le N$ and all the node pairs are mutually distinct.

Subtask 1 (40 Points): $1 \le n, m \le 5000$

Subtask 2 (60 Points): $1 \le n, m \le 3 \times 10^5$

Sample Input

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

Sample Output

```
4
```

The orientation of the edge between nodes 1 and 2 doesn't matter. The edges between 2 and 4 must be oriented either from 2 to 4 or from 4 to 2. So, there are $2 \times 2 = 4$ ways.

Limits

Time: 1 second

Memory: 512 MB