Problem J: Anita and the Tree of Christmas

Filename: `tree`

Time limit: `4 seconds`

Anita, Simi, Anya, and Arup — Arup's brilliant family — are decorating their Christmas tree this year in the spirit of recursion, computation, and holiday cheer. But their tree is no ordinary tree — it's a rooted tree with n nodes, where each node represents a decoration point, and every node (except the root) has exactly one parent.

As they started hanging ornaments, Simi suddenly posed a math challenge:

- "What's the product of the sizes of all subtrees, modulo $10^9 + 7$?"

The subtree size of a node is defined as the total number of nodes in its subtree, including itself.

Being the programming wizard of the family, Anita turned to you to write code that could compute this product of all subtree sizes efficiently for any given tree rooted at node 1.

The Problem

Given a rooted tree with n nodes (node 1 is the root), compute the product of the sizes of all n subtrees, modulo $10^9 + 7$.

The Input

The first line contains an integer **c**, the number of test cases.

The first line of each test case has a single integer, **n**, representing the number of nodes in the tree. Each of the next **n-1** lines contains two integers **u** and **v**, indicating an undirected edge between nodes **u** and **v**. It is guaranteed that the graph described will be a tree of **n** vertices. For the purposes of the question, treat node 1 as the root of the tree.

The Output

For each test case, out the product of the sizes of all of the subtrees of the input tree modulo 10^9+7, where node 1 is considered the root of the tree.

Input Bounds and Corresponding Credit

30 Points	70 Points
• **c** ≤ 10 • 1 ≤ **n** ≤ 100 • 1 ≤ **u, v** ≤ **n**, **u ≠ v**	• **c** ≤ 15 • 1 ≤ **n** ≤ 10^5 • 1 ≤ **u, v** ≤ **n**, **u ≠ v**

Samples

Input	Output
2 5 1 2 1 3 3 4 3 5 3 1 2 1 3	15 3

Sample Explanation: Here are the subtree sizes for each subtree rooted at nodes 1 through 5 in the first sample case and their product.

- Node 1: size 5
- Node 2: size 1
- Node 3: size 3
- Node 4: size 1
- Node 5: size 1
- Product = 5 × 1 × 3 × 1 × 1 = 15

In the second sample case, the three subtree sizes are 3, 1 and 1, respectively (for nodes 1, 2 and 3), for a product of 3.