Multiplication Tree

— Problem Description

A tree with N nodes numbered from 1 to N is given, the product of values assigned to these N nodes is to be computed. Here, Node 1, Node 2, ..., Node N are the names of the nodes. The tree is rooted at Node 1.

The values are assigned to the nodes in the following manner:

- Node 1 always has a value of 1

- If a node X in the tree has children, then the HCF (highest common factor) of values of all the child nodes should be equal to the value at node X

- All the nodes in the same level should be assigned with distinct values

- The assignment should be in such a manner that the product of the values assigned to all nodes in the entire tree, is minimum

Finally, display the product obtained.

— Constraints

2 <= N <= 20

— Input

First line contains an integer N, which denotes the number of nodes in a tree.

Next (N-1) lines contain two space separated values which denote an edge connected between them.

— Output

Print the product of values assigned to all the nodes, modulo 1e9 + 7.

— Time Limit (secs)

1

— Examples

Example 1

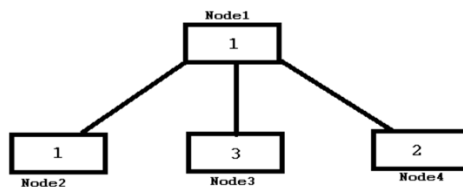Input

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4
1 2
1 3
1 4
```

Output

6

Explanation-

Given N=4 indicates four number of nodes.

The next N-1, i.e., 3 lines 1 2, 1 3, 1 4 indicate there is an edge between 1,2; 1,3; 1,4.

First, Node 1 is always assigned with value 1.

Then value 1 is assigned to Node 2, value 3 to Node 3 and value 2 to Node 4. Then HCF of Node 2, Node 3 and Node 4 is 1 which is the value of Node 1.

The product of values of all the nodes is 6.

If value 2 is assigned to Node 2, value 3 to Node 3 and Value 5 to Node 4, then though the HCF of these nodes is 1, but the product of all nodes is 30 which is greater than 6. So, assign values in such a manner that the product of values assigned to the nodes is minimum.

Example 2

Input

4

1 2

1 3

2 4

Output

2

Explanation

Here, N = 4 denotes the total number of nodes in a multiplication tree. Next 3 lines denote edges between 1,2; 1,3; 2,4. Node 2 and Node 3 are at the same level. Hence, their value has to be distinct. However, node4 is at different level. Hence, it can use values used in other levels.

When values assigned to Node 1, Node 2, Node 3 and Node 4 are 1, 1, 2 and 1 respectively, then the HCF constraints at all levels and minimization of product of all nodes is met. Hence, the output is 1 * 1 * 2 * 1 which is 2.