Problem: Multiple Paths

Time limit: 1 second
Memory limit: 64 MB

Problem Statement

In Pandacity, there is an area with N junctions conveniently labeled 1 to N. Connecting these N junctions are $N-1$ bi-directional roads, each one connecting 2 different junctions a and b. No 2 roads connect the same pair of junctions.

The roads have been constructed such that for every pair of distinct junctions, there is exactly one way to get from 1 junction to another without traveling the same road twice. Thus, the people who live in these area have never used Google Maps and have no experience with choosing paths to take from 1 place to another.

The government has recently decided that they should build more roads because traffic is getting congested and also traveling times are very long for some pairs of junctions. However, building these roads will be confusing for the inhabitants because they are going to have multiple paths to take to travel between junctions

The government wants to evaluate how much the road building is going to affect the area and needs your help. They have Q plans for roads to build and each plan connects two existing junctions u and v. Building such a road may result in a self loop or two junctions with multiple roads connecting them.

For each plan, the government wants to know how many pairs of junctions are there such that if they build the road, there will be more than one way to travel from one junction to the other without traveling on the same road twice. Since the roads are not built yet, the queries are independent of each other.

Input

The first line of input will contain N.
The next $N-1$ lines of input will each contain a pair of integers a and b, indicating that there is an edge from vertex a to b. It is guaranteed that $a \neq b$ and every pair of junctions will appear at most once.
The next line of input will contain Q.
The next Q lines of input will each contain a pair of integers u and v, indicating that the government is considering constructing a road between u and v.

Output

Output Q lines, the answers to the queries in the same order as given in the input.

Subtasks

Subtask	Score	Limits
1	21	$1 \leq N, Q \leq 300$
1	27	$1 \leq N, Q \leq 2000$
1	18	$1 \leq N, Q \leq 10^5$, all roads are between junction i and $i+1$
4	34	$1 \leq N, Q \leq 10^5$

For all test cases, $1 \leq a, b, u, v \leq N$

Sample Input

```
10
1 2
1 3
2 4
1 5
3 6
3 7
6 8
5 9
5 10
5
2 4
1 8
3 9
9 6
4 10
```

Sample Output

```
9
29
35
39
34
```

Sample Explanation

For the first query, there is now more than one way to travel from 4 to every other city so the answer is 9.