



Scavenger Hunt

Mouse Daniel is preparing a scavenger hunt and already prepared all locations. He now has to decide on an order in which they should be visited. The road system is a tree, i.e. there is exactly one path between any two locations.

He needs to answer questions of the following format: given two locations, how far apart are they.

Input

The first line contains an integer N , the number of locations.

The next $N - 1$ lines contain roads, written as two numbers a_i and b_i ($1 \leq a_i \leq N$ and $1 \leq b_i \leq N$), denoting a road between a_i and b_i (for $1 \leq i \leq N - 1$).

The next line contains Q , the number of questions. The next Q lines each contain two numbers p_j and q_j : Daniel wants to know how long the path between p_j and q_j is.

Output

Print Q lines, the answers to the questions.

Limits

- Subtask 1: $1 \leq N \leq 100, 1 \leq Q \leq 100$
- Subtask 2: $1 \leq N \leq 10\,000, 1 \leq Q \leq 10\,000$
- Subtask 3: $1 \leq N \leq 100\,000, 1 \leq Q \leq 100\,000$
- Subtask 4: $1 \leq N \leq 100\,000, 1 \leq Q \leq 100\,000$

Samples

Input	Output
5 0 4 4 1 1 3 4 2 3 3 2 0 1 4 4	3 2 0