Nokotan's Guidance

null_awe

1 Problem Statement

Shikanoko Nokonoko Koshitantan: Nokotan rides atop a deer herd.

Nokotan's universe has been transformed into a **triangle graph** with n nodes ($3 \leq n \leq 1.5 \times 10^5$)! A triangle graph is constructed as follows:

1. Start with a complete graph of size 3 with nodes 1, 2, and 3.
2. Each node after from 4 to n is created by selecting any two adjacent nodes u and v within the existing graph and connecting the new node to both u and v.

Nokotan takes great pride in being very familiar with the land. There are q deer ($1 \leq q \leq 1.5 \times 10^5$) that wish to indulge in Nokotan's wisdom. Deer i has a query with two integers s_i and t_i, and wish to know the minimum distance between the two nodes.

Nokotan is feeling overwhelmed with all of these queries! Please help her!

2 Input

The first line contains a single integer n, the size of the triangle graph.

Each of the next $n-3$ lines contains two integers u_i and v_i (i ranging from 4 to n), the two adjacent nodes that serve as the base for the new node i.

The next line contains a single integer q, the number of queries.

Each of the next q lines contains two integers s_i and t_i.

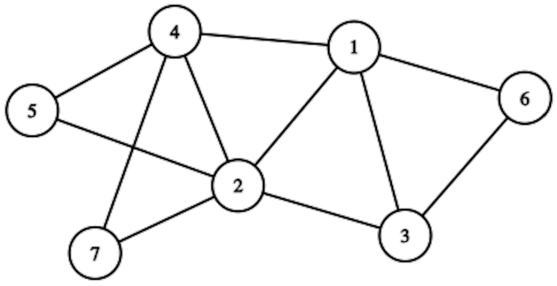
3 Output

For each query i, output the minimum distance between nodes s_i and t_i.

4 Samples

Sample Input 1	Sample Output 1
7 1 2 2 4 3 1 4 2 5 1 5 2 6 3 6 3 7 6 7	2 2 1 2 3

5 Explanation



The triangle graph created based off the sample input.

Looking at the pairs of nodes within the queries, we can determine that the minimum distances are indeed as the sample output shows.