

Problem L. Lucas Numbers

Input: Standard
Output: Standard
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Ailin is a beautiful girl who likes math and one day she decides to study about series in order to distract herself. She starts reading about the Lucas series and because she likes the numbers greater than two, she defines the series:

$$L(n) = \begin{cases} 3 & \text{if } n = 1 \\ 4 & \text{if } n = 2 \\ L(n-1) + L(n-2) & \text{if } n \geq 3 \end{cases}$$

Ailin also likes the trees, so she has a weighted tree, and she needs to run Q queries on the tree, each of which can be one of the following two types:

- 1 $A B$: Calculate the distance between A and B .
- 2 $A B$: Add the first elements of the Lucas series to the edges which lie on a simple path between nodes A and B .

It's Saturday and she wants to solve the problem quickly and then go to shopping... Can you help her?

Input

Input contains several test cases. The first line in the each test case contains a single integer n , the number of vertices in the tree ($1 \leq n \leq 10^5$). The next $n - 1$ lines contains three integers a_i , b_i and c_i ($1 \leq a_i, b_i \leq n, 1 \leq c_i \leq 10^9$) describing the edges of the graph, it means a edge with c_i distance between nodes a_i and b_i (the vertices are indexed from 1 to n). Next line contains an integer Q , the number of queries ($1 \leq Q \leq 10^5$). The next Q lines contains three integers T , A and B ($1 \leq A, B \leq n, 1 \leq T \leq 2$) describing the queries. The distance between nodes may be very large, so compute the answers modulo $10^9 + 7$. There is at least one query of the first type.

See the examples below for more details.

Output

For each query of type 1, output one line with the answer required.



Example

Input	Output
6	6
2 3 2	17
2 1 3	0
3 5 1	12
1 4 1	
1 6 1	
6	
1 1 5	
2 6 3	
1 1 5	
1 4 4	
2 3 4	
1 6 4	

Use fast I/O methods