Longest Mod Path

HackerRank

In the middle of a nightmare, Maxine suddenly finds herself in a mysterious room with the following items:

1. A piece of paper with the word *score* and the integer 0 written on it.
2. A map of the castle where the room is located.
   - There are N rooms uniquely labeled from 1 to N.
   - There are N bidirectional corridors connecting pairs of rooms. The value of *score* changes every time she travels up or down a corridor, and this value differs depending on her direction of travel along the corridor. Each corridor can be traveled any number of times in either direction.
   - Every room is reachable from every other room.
   - Maxine is located in the room labeled S.
   - The exit is located in the room labeled E. Once this room is reached, *score* is reduced *modulo* M and Maxine can (but is not required to) exit that level!

Assume some corridor i (where $1 \le i \le N$) is associated with an integer, x_i, and connects rooms a_i and b_i. Then:

- Traveling corridor i from room a_i to room b_i *increases score* by x_i.
- Traveling corridor i from room b_i to room a_i *decreases score* by x_i.

There are Q levels to Maxine's nightmare castle, and each one has a different set of values for S, E, and M. Given the above information, help Maxine by finding and printing her maximum possible score for each level. Only you can help her wake up from this nightmare!

Note: Recall that the result of a modulo operation is *always non-negative*. For example, $(-8) \bmod 5 = 2$.

Input Format

The first line contains a single integer, N, denoting the number of rooms.
Each of the N subsequent lines describes a corridor in the form of three space-separated integers denoting the respective values for a_i, b_i, and x_i.
The next line contains a single integer, Q, denoting the number of queries.
Each of the Q subsequent lines describes a level in the form of three space-separated integers denoting its respective S, E, and M values.

Constraints

- $1 \le N \le 10^5$
- $1 \le a_i, b_i \le N$, $a_i \ne b_i$
- $1 \le x_i \le 10^9$

- $1 \leq Q \leq 10^5$

For each level:

- The room layout is the same
- $1 \leq S, E \leq N$
- $1 \leq M \leq 10^9$

Subtask

- $1 \leq N, Q, M \leq 300$ for 30% of max score.

Output Format

For each of the Q levels, print the maximum possible score for that level on a new line.

Sample Input

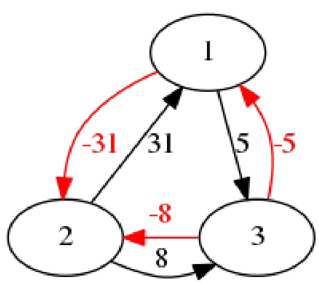
```
3
1 3 5
2 3 8
2 1 31
1
1 2 13
```

Sample Output

```
12
```

Explanation

The *Sample Input* represents the following setup:



We want to travel from room 1 to room 2 while maximizing the value of *score*. There are at least two ways to achieve the maximum *score* value of 12:

1. Travel through corridors 5 times: $1 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 3 \rightarrow 2$

   $$score = (5 - 8 + 31 + 5 - 8) \bmod 13 = 25 \bmod 13 = 12.$$

2. Travel through corridors 34 times:
   $1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow \ldots \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 2$
   $score = -339 \bmod 13 = 12$, because 12 is the smallest non-negative integer x such that 13 divides $(-339 - x)$.