Task 3: Truck (`truck`)

In a faraway world, there are N towns, in these towns are heroes and they are preparing for an impending battle. However, while preparing their stores, they needed more gold! They needed money to buy more food and weapons. Thus, to deliver gold between towns, the heroes utilise their safest and most reliable transportation vehicles, Trucks.

The N towns are connected via $N-1$ roads in a way such that there is **exactly one path between any two towns using one or more roads**. These roads are numbered from 1 to $N-1$ each having their own length D_i. Also, there is a gatekeeper on each road which will collect a certain amount of gold bars as a toll for using the road, the toll for each road can be different and vehicles are required to pay this toll before using the road. **Notably, the i^{th} road connects towns A_i and B_i, has distance of D_i and toll cost of T_i.**

Obviously, the heroes have to pay for the fuel costs of travelling in the trucks. The amount of fuel used by a truck depends on the amount of gold it is currently carrying. **Notably, if the truck is carrying X gold bars and travels 1 unit distance, it will use up X units of fuel.**

The heroes have arranged a bunch of trips where the i^{th} trip requires G gold bars to be transported from town A_i to B_i. **(Note that G is constant across all trips.)** Which is to say, in addition to the gold bars being used to pay for the tolls, an additional G have to be delivered to the destination town at the end of the trip. The heroes would like to minimise the amount of fuel used and would take the optimal route and carry the optimal number of gold bars to pay the tolls and minimise fuel usage. However, between trips the toll cost of certain roads may change and thus affect the fuel used in future trips.

Since, the heroes are busy preparing for battle, they do not have time to calculate their fuel usage and would like you to do so for them for each trip (this is a query operation). Keep in mind that between trips the toll cost of certain roads may change (this is an update operation). Given the correct order of events with the trips they are planning and the toll changes of roads, calculate their fuel consumption for each trip. As the result can be very large, you should give the answer modulo $10^9 + 7$.

Input

Your program must read from standard input.

The first line contains two integers N and G, the number of towns and the number gold bars each trip will transport.

$N-1$ lines will follow. The i^{th} line contains 4 integers, A_i, B_i, D_i and T_i.

The next line contains a single integer Q representing the total number of trips and changes to tolls on the roads (i.e. the total number of query and update operations).

Q lines will follow. The i^{th} line will begin with an integer V_i:

- If $V_i = 0$, this represents a update operation; the line will contain 3 more integers X Y T, which indicates that the toll of the road that connects town X and Y is changed to T.
- If $V_i = 1$, this represents a query operation; the line will contain 2 more integers X Y, which indicates a trip from town X to town Y.

Output

Your program must print to standard output.

For each query operation, you should output a line containing a single integer — the minimum fuel used in the trip modulo $10^9 + 7$.

The result of each trip needs to be outputted in the same order as given in the input.

Implementation Note

As the input lengths may be very large, you are recommended to use C++ with fast input routines to solve this problem. The scientific committee does not have a solution written in Java or Python that can fully solve this problem.

C++ and Java source files containing fast input/output templates have been provided in the attachment. You are strongly recommended to use these templates.

If you are implementing your solution in Java, please name your file `Truck.java` and place your `main` function inside `class Truck`.

Subtasks

The maximum execution time on each instance is 2.0s, and the maximum memory usage on each instance is 512MiB. For all testcases, the input will satisfy the following bounds:

- $2 \leq N \leq 100\,000$
- $1 \leq Q \leq 100\,000$
- $1 \leq A_i, B_i \leq N$
- $1 \leq D_i, T_i, G \leq 10^9$

Your program will be tested on input instances that satisfy the following restrictions:

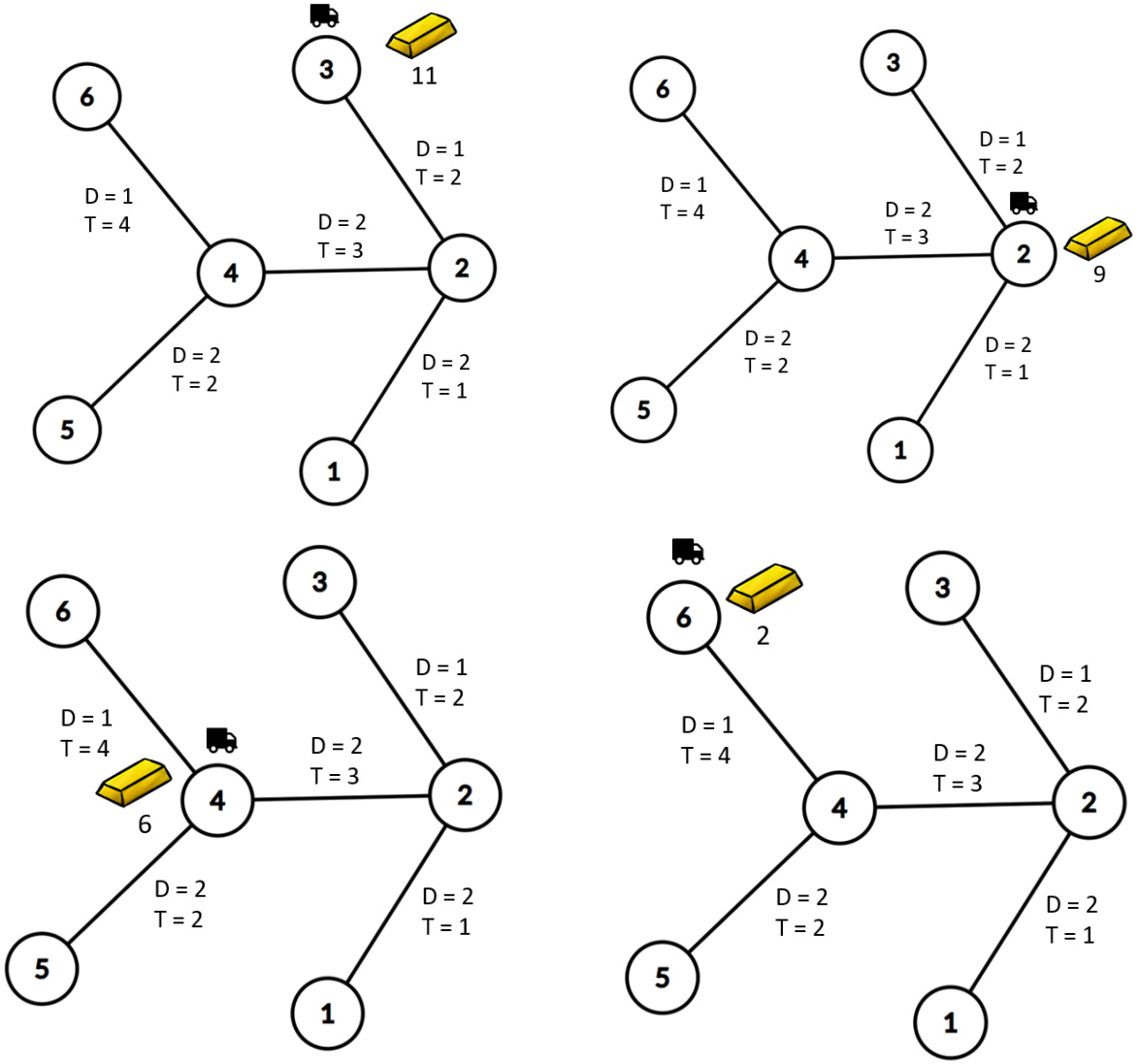
Subtask	Marks	V_i	Additional Constraints
1	5	$V_i = 1$	Each town has at most **two roads** connected to it $T_i = 0$
2	9		$T_i = 0$
3	12		$T_i = T_j$ for all $i \neq j$ $D_i = 1$
4	17		Each town has at most **two roads** connected to it
5	20	$0 \leq V_i \leq 1$	Each town has at most **two roads** connected to it
6	18		$N, Q \leq 5000$
7	19		-

Sample Testcase 1

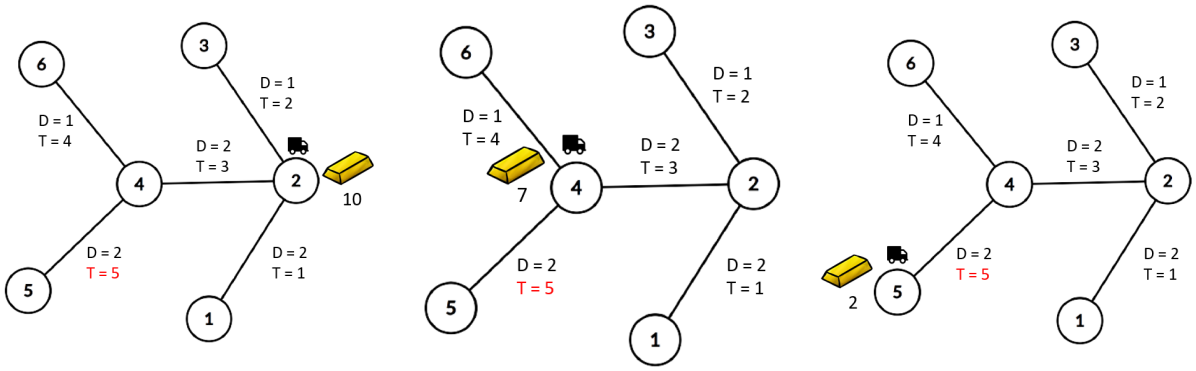
This testcase is valid for subtasks 6 and 7.

Input	Output
6 2 1 2 2 1 2 3 1 2 2 4 2 3 4 5 2 2 4 6 1 4 3 1 3 6 0 4 5 5 1 2 5	23 18

Sample Testcase 1 Explanation



The first query asks for a journey from node 3 to 6, transporting 2 gold bars. The truck will start at node 3 with 11 gold bars as it is the minimum number of gold bars required to end at node 6 with 2 gold bars. Travelling from node 3 to 2, we first pay 2 gold bars for the toll, ending up with 9 gold bars. Travelling a distance of 1 unit with 9 gold bars consumes 9 units of fuel. Similarly, from node 2 to 4 we have 6 gold bars, consuming 12 units of fuel and from node 4 to 6 we have 2 gold bars consuming 2 units of fuel. Totaling up to 9 + 12 + 2 = 23 units of fuel.



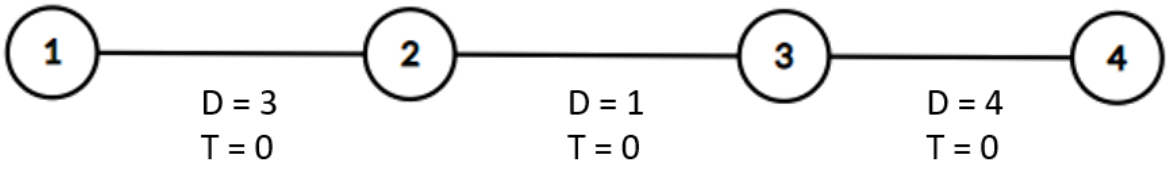
For the second query we change the toll on the road connecting 4 and 5 to 5. Then the third query asks for a journey from node 2 to 5 to transport 2 gold bars. Optimally, we begin at node 2 with 10 gold bars. To travel from node 2 to 4 we first spend 3 gold bars on the toll, to be left with 7 bars and then travel the road, consuming 14 units of fuel. Similarly, we travel on the road from node 4 to 5 with 2 gold bars consuming 4 units of fuel, totalling to 14 + 4 = 18 units of fuel.

Sample Testcase 2

This testcase is valid for subtasks 1, 2, 4, 5, 6 and 7.

Input	Output
4 3 1 2 3 0 2 3 1 0 3 4 4 0 1 1 1 4	24

Sample Testcase 2 Explanation



There are no tolls, hence the truck can just start will 3 gold bars and travel from node 1 to 4. Travelling a distance of 8 units, thus consuming $8 \times 3 = 24$ units of fuel.