Bochi

2024/2025 SEASON – SECOND ROUND

Bochi went into a casino for the first time last month. Due to certain circumstances, we find him again in a similar building. The game he is playing is the new Tree Roulette.

The tree is made up of N vertices and there are N-1 two-way edges, connecting two vertices. You can reach every vertex from every other vertex, using the edges. Each edge also has a different weight. At the beginning of the game, the croupier chooses a start vertex a and end vertex b after which he places the pawn at vertex a. Every turn is made up of the following decisions:

- If the pawn is at vertex b, there is a 50% chance for the game to end on this turn.

- If the pawn isn't on vertex b or it was decided for the game to continue, the croupier chooses randomly on which of the neighboring vertices to go. The odds for every neighbor is the weight of the edge to that neighbor, divided by the sum of all weights of edges going through the vertex. After choosing the next vertex, the croupier moves the pawn there, and the next turn begins.

The casino allows players to bet on how many turns it will take for the game to end. Since Bochi is 40 leva down, he decided to use math to help himself. He was able to calculate the Expected Number of Turns after which the game will end and with a smart bet managed to win back 10 leva. But since he got tired of the calculations, he decided to leave the remaining job for you.

The game repeats M times and on spin i the croupier chooses start and end vertices a_i and b_i. Bochi gives you the tree and the different start and end vertices and asks you to calculate the Expected Number of Turns for every game.

Input

The first line of the file **bochi.in** contains N and M – the number of vertices and the number of spins. Each of the next N-1 lines contains 3 numbers a_i, b_i and c_i, describing that there is an edge between a_i and b_i with weight c_i. Each of the next M lines contains 2 numbers a_i and b_i, describing the start and end vertices of that spin.

Output

In the file **bochi.out** print M lines, containing one number each: the desired Expected Number of Turns for the corresponding spin. If the absolute difference between your answer and the actual value is less than **0.01**, your answer will be considered correct.

Constraints

$1 \leq N, M \leq 2 * 10^5$

$1 \leq c_i \leq 1000$

$1 \leq a_i, b_i \leq N$

Bochi

Time Limit: 1 sec.

Memory Limit: 256 MB.

Sample Test

Input (bochi.in)	Output (bochi.out)
7 4	44.25
1 2 3	60
1 3 1	27.5
2 4 4	47
2 6 5	
3 5 2	
5 7 6	
1 5	
4 7	
3 2	
6 3	

Sample Illustration