

## E. Iron Man

time limit per test: 5 seconds  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

Tony Stark is playing a game with his suits (they have auto-pilot now). He lives in Malibu. Malibu has  $n$  junctions numbered from 1 to  $n$ , connected with  $n - 1$  roads. One can get from a junction to any other junction using these roads (graph of Malibu forms a tree).

Tony has  $m$  suits. There's a special plan for each suit. The  $i$ -th suit will appear at the moment of time  $t_i$  in the junction  $v_i$ , and will move to junction  $u_i$  using the shortest path between  $v_i$  and  $u_i$  with the speed  $c_i$  roads per second (passing a junctions takes no time), and vanishing immediately when arriving at  $u_i$  (if it reaches  $u_i$  in time  $q$ , it's available there at moment  $q$ , but not in further moments). Also, suits move continuously (for example if  $v_i \neq u_i$ , at time it's in the middle of a road. Please note that if  $v_i = u_i$  it means the suit will be at junction number  $v_i$  only at moment  $t_i$  and then it vanishes).

An explosion happens if at any moment of time two suits share the same exact location (it may be in a junction or somewhere on a road; while appearing, vanishing or moving).

Your task is to tell Tony the moment of the the first explosion (if there will be any).

### Input

The first line of the input contains two integers  $n$  and  $m$  ( $1 \leq n, m \leq 100\,000$ ) — the number of junctions and the number of suits respectively.

The next  $n - 1$  lines contain the roads descriptions. Each line contains two integers  $a_i$  and  $b_i$  — endpoints of the  $i$ -th road ( $1 \leq a_i, b_i \leq n, a_i \neq b_i$ ).

The next  $m$  lines contain the suit descriptions. The  $i$ -th of them contains four integers  $t_i, c_i, v_i$  and  $u_i$  ( $0 \leq t_i \leq 10\,000, 1 \leq c_i \leq 10\,000, 1 \leq v_i, u_i \leq n$ ), meaning the  $i$ -th suit will appear at moment of time  $t_i$  at the junction  $v_i$  and will move to the junction  $u_i$  with a speed  $c_i$  roads per second.

### Output

If there would be no explosions at all, print  $-1$  in the first and only line of output.

Otherwise print the moment of the first explosion.

Your answer will be considered correct if its relative or absolute error doesn't exceed  $10^{-6}$ .

### Examples

input
6 4 2 5 6 5 3 6 4 6 4 1 27 6 1 3 9 5 1 6 27 4 3 4 11 29 2 6
output
27.3

input
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6 4
3 1
4 5
6 4
6 1
2 6
16 4 4 5
13 20 6 2
3 16 4 5
28 5 3 5
```

output

-1