Packet Transmission

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	512 megabytes

You are given a connected network **tree** representing routers and channels. Each node represents a router, and each edge represents a channel connecting two routers. These channels are used to transmit packets from one router to one of its adjacent routers, and the transmission follows the TCP/IP protocol. The edges are labeled with t_i indicating the time (in arbitrary units) it takes to transmit a packet from u_i to v_i or vice versa.

Additionally, each router has enough storage capacity to store any number of packets, they can store packets there indefinitely and they can transmit multiple packets simultaneously but via different channels. This means that you can't send a packet via a channel that is currently occupied by another transmission.

Your task is to send two packets concurrently, one from s_1 router to d_1 router and another from s_2 router to d_2 router. Determine the optimal transmission strategy to minimize the maximum time for delivering both of these packets from source to destination.

Input

Input starts with an integer $T (1 \leq T \leq 1000)$ denoting the number of test cases. Each of the test cases starts with two integers N and $Q (1 \leq N, Q \leq 100000)$. Then there will be $N-1$ lines of input consisting of three integers $u_i, v_i, t_i (1 \leq u_i, v_i \leq N, u_i \neq v_i, 1 \leq t_i \leq 10^9)$ representing the i^{th} edge of the tree.

Then, there will be Q lines each with four integers $s_1, d_1, s_2, d_2 (1 \leq s_1, d_1, s_2, d_2 \leq N)$ representing the source and destination routers for two packets. It is guaranteed that the sum of N is at most 500000 and the sum of Q is at most 500000 across all test cases.

Output

For each query, please use the optimal transmission strategy to minimize the maximum time to deliver both packets and print that minimum time in a separate line.

Example

standard input	standard output
2 8 3 1 2 3 2 3 5 2 6 7 3 4 4 4 5 3 6 7 2 1 8 6 1 8 2 6 1 5 2 3 5 8 8 5 4 2 1 2 1 2 3 1 3 4 1 1 2 3 4 1 4 2 3	7 15 24 1 3