Problem B. Mountain Booking

Input file:	`standard input`
Output file:	`standard output`
Time limit:	6 seconds
Memory limit:	512 megabytes

Byte Mountain is a beautiful tourist attraction in Byteland. There are n areas on the Byte Mountain, labeled by $1, 2, \ldots, n$, connected by $n-1$ undirected roads. There is exactly one path between each pair of different areas. In other words, the map of the mountain is a tree with n nodes.

Assume today is day 0. In each of the next m days, the map of the mountain will be changed a little. Formally, in the early morning of day i ($1 \le i \le m$), the k_i-th road will be closed forever, and another new road will be built, but the map of the mountain will always be a tree.

You are given the road construction plans for all the next m days, together with bookings of p tourists. The i-th tourist will visit the b_i-th area in the afternoon of day a_i, and will leave the mountain that night. You are now wondering about some interesting metrics.

Note that each road is weighted. Let $f(u, v)$ be the maximum value of weights among all the roads on the unique single path from u to v ($u \neq v$). You will be given q queries. In the i-th query, you will be given two integers c_i and d_i. You are required to calculate the following metric of the d_i-th area on the c_i-th day:

$$\sum_{1 \le j \le p,\, a_j = c_i,\, b_j \neq d_i} f(b_j, d_i)$$

Input

The first line of the input contains four integers n, m, p and q ($2 \le n \le 10^5, 1 \le m, p, q \le 2 \times 10^5$), denoting the number of areas, the number of incoming days, the number of tourists and the number of queries, respectively.

Each of the next $n-1$ lines contains three integers u_i, v_i and w_i ($1 \le u_i, v_i \le n$, $u_i \neq v_i$, $1 \le w_i \le 10^9$), denoting a two-way road between the u_i-th area and the v_i-th area, whose weight is w_i. The i-th road is labeled by i ($1 \le i < n$). These $n-1$ roads describe the map of the mountain at day 0.

Each of the next m lines contains four integers k_i, u_i, v_i and w_i ($1 \le k_i \le n-2+i$, $1 \le u_i, v_i \le n$, $u_i \neq v_i$, $1 \le w_i \le 10^9$), denoting that at day i the road k_i will be closed forever, and the new road labeled by $n-1+i$ will be built between the u_i-th area and the v_i-th area, whose weight is w_i. It is guaranteed that the map of the mountain will always be a tree, and no road will be closed more than once.

Each of the next p lines contains two integers a_i and b_i ($1 \le a_i \le m$, $1 \le b_i \le n$), describing a tourist's booking.

Each of the next q lines contains two integers c_i and d_i ($1 \le c_i \le m$, $1 \le d_i \le n$), describing a query.

Output

For each query, print a single line containing an integer, denoting the answer.

Example

standard input	standard output
5 3 6 6 1 2 9 1 3 4 1 4 6 4 5 2 3 3 5 3 2 1 5 5 5 3 4 8 1 3 2 1 3 3 2 4 1 5 2 4 1 1 1 3 2 5 2 3 3 1 3 3	8 3 9 11 8 0