Problem A: Alice's Travels II
Time Limit: 5 seconds

Description

Alice is a merchant in the world. Layout of this world is a tree on N nodes (i.e., there is only one simple path between any two cities). Each city has an infinite number of gems, each with cost T_i dollars and brightness S_i. Suppose Alice traveled from city U to city V on the shortest path and started with K dollars, then the maximum total brightness (from gems purchased on her route, without exceeding K dollars) she can achieve is a some function; let's call it $f(K)$. Compute the following 2 quantities:

$g(K) = \sum_{i=1}^{K} f(i)$ and $h(K) = f(1) \wedge f(2) \ldots \wedge f(K)$ where ^ means XOR.

Input

A number of inputs (≤**20**) described as follows. Input start with N, the number of cities ($0<N\leq40000$) and K ($0<K \leq 61$), the maximum dollars. This is followed by $N-1$ line consecutively, with two numbers x and y between 1 and N on each line, specifying there is a road between cities x and y. Next is a line with N numbers, which is the cost of the gems T_i ($0<T_i \leq K$). This is followed by a line with N integers, the brightness of the gems S_i ($0<S_i \leq 10^6$), The next line is an integer Q, the number of inquiries ($0<Q\leq40000$). Then Q lines, each line input three positive integer U, V, which means Alice travels from city U to city V**.** Note that $1 \leq x, y, U, V \leq N$.

Output

Output for each query, g(K) and h(K), separated by a space.

Sample Input

```
5 10
1 2
2 3
2 4
1 5
1 2 3 4 5
10 15 30 45 50
2
1 1
5 4
```

Sample Output

```
550 14
600 64
```