C2 - Subset of Subset (Hard version)

Description

The only difference between easy and hard versions is constraints of k.

You are given a tree consisting of n nodes numbered from 1 to n.

For the i th node, we define w_i as its value.

For a set T that has n nodes $a_1, a_2, \ldots . a_n$, we define its value as $\sum_{i=1}^{n} w_{a_i}$.

You should process q queries , each contains two integers k, m and a sequence $a_1, a_2 \ldots . a_m$. m is the length of the sequence. k is a special parameter we will explain later. The sequence means that set S has m nodes $a_1, a_2, \ldots . a_m$.

For each query, your task is to select a subset T of S in which no two nodes are adjacent. **Two nodes are considered to be adjacent if and only if their distance is no more than k.** Output the max possible value of T.

Input

The first line contains two integers n and q $(1 \leq n \leq 10^5, 1 \leq q \leq 10^5)$.

The second line contains n integers $w_1, w_2, \ldots, w_n (1 \leq w_i \leq 10^9)$.

Each of the next $n-1$ lines contains two integers u_i and $v_i (1 \leq u_i, v_i \leq n)$,indicating an undirected edge (u_i, v_i) . It's guaranteed that the graph would be a tree.

Each of the next q lines contains two integers k, m $(1 \leq k \leq 2, 1 \leq m \leq 10^5)$ and a sequence of length m, depicting an query.

It's guaranteed that $\sum m \leq 2 \cdot 10^6$.

Output

For each query, you should output the required answer in a separate line.

Sample

Input

```
6 3
5 8 14 8 2 7
1 3
2 3
3 4
4 5
4 6
1 3 1 2 3
2 5 1 2 4 5 6
1 6 1 2 3 4 5 6
```

Output

```
14
15
23
```