Queries on a Tree

Time limit: *1500 ms*
Memory limit: *256 MB*

Anton has a tree of N vertices numbered from 1 to N. Vertex i initially has value A_i. Anton has a brother that likes to come around and remove some edges from the tree. After such removal $value$ of the graph is a sum of $values$ of all connected components. A $value$ of a connected component is a square of the sum of values of all vertices in it.

Anton is going to perform Q changes to his tree. In the i-th one he is going to change the value of A_{x_i} to C_i. After every change Anton wants you to calculate the sum of $values$ of all graphs obtainable via removing any number of edges from the original tree. Since this value may be very large, he would like it modulo 998244353.

Standard input

The first line contains two numbers N and Q. The next line contains N integers, i-th one representing A_i. The next $N-1$ lines describe edges in the tree. The i-th of these lines contains two numbers u_i, v_i representing and edge between vertices u_i and v_i. Then, Q lines follow, each one represents consecutive changes made to the tree. The i-th one of these lines contains two numbers x_i and C_i meaning that A_{x_i} is being set to C_i.

Standard output

The i-th line of output should contain one number - the sum of $values$ of all graphs obtainable from the tree, after the i-th change, by removing any number of edges from it, printed modulo 998244353.

Constraints and notes

- $1 \leq N, Q \leq 10^5$,
- $1 \leq A_i \leq 10^5$ for all i from 1 to N,
- $1 \leq u_i, v_i \leq N$ and the edges represent a tree,
- $1 \leq x_i \leq N$ and $1 \leq C_i \leq 10^5$ for all i from 1 to Q

Input	Output
3 3 1 1 1 1 2 2 3 1 1 1 2 2 3	22 40 96