Counting On a Tree

HackerRank

Taylor loves trees, and this new challenge has him stumped!

Consider a tree, t, consisting of n nodes. Each node is numbered from 1 to n, and each node i has an integer, c_i, attached to it.

A *query* on tree t takes the form `w x y z`. To process a query, you must print the count of ordered pairs of integers (i, j) such that the following four conditions are all satisfied:

- $i \neq j$
- $i \in$ the path from node w to node x.
- $j \in$ path from node y to node z.
- $c_i = c_j$

Given t and q queries, process each query in order, printing the pair count for each query on a new line.

Input Format

The first line contains two space-separated integers describing the respective values of n (the number of nodes) and q (the number of queries).
The second line contains n space-separated integers describing the respective values of each node (i.e., $c_1, c_2, \ldots, c_n$).
Each of the $n - 1$ subsequent lines contains two space-separated integers, u and v, defining a bidirectional edge between nodes u and v.
Each of the q subsequent lines contains a `w x y z` query, defined above.

Constraints

- $1 \leq n \leq 10^5$
- $1 \leq q \leq 50000$
- $1 \leq c_i \leq 10^9$
- $1 \leq u, v, w, x, y, z \leq n$

Scoring for this problem is Binary, that means you have to pass all the test cases to get a positive score.

Output Format

For each query, print the count of ordered pairs of integers satisfying the four given conditions on a new line.

Sample Input

```
10 5
10 2 3 5 10 5 3 6 2 1
1 2
```

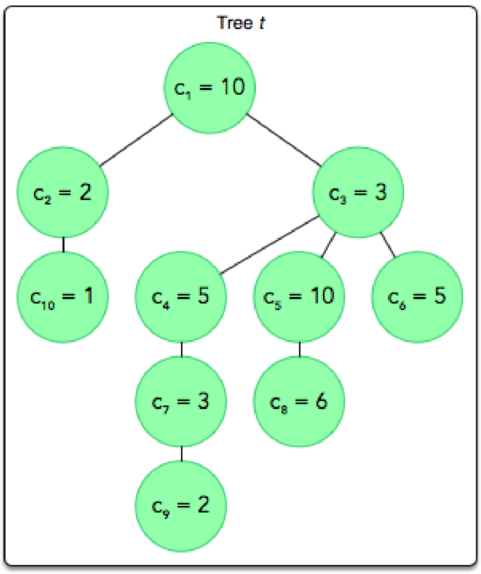
```
1 3
3 4
3 5
3 6
4 7
5 8
7 9
2 10
8 5 2 10
3 8 4 9
1 9 5 9
4 6 4 6
5 8 5 8
```

Sample Output

```
0
1
3
2
0
```

Explanation

We perform $q = 5$ queries on the following tree:



1. Find the number of valid ordered pairs where i is in the path from node 8 to node 5 and j is in the path from node 2 to node 10. No such pair exists, so we print 0.
2. Find the number of valid ordered pairs where i is in the path from node 3 to node 8 and j is in the path from node 4 to node 9. One such pair, $(3, 7)$, exists, so we print 1.
3. Find the number of valid ordered pairs where i is in the path from node 1 to node 9 and j is in the path from node 5 to node 9. Three such pairs, $(1, 5)$, $(3, 7)$, and $(7, 3)$ exist, so we print 3.
4. Find the number of valid ordered pairs where i is in the path from node 4 to node 6 and j is in the path from node 4 to node 6. Two such pairs, $(4, 6)$ and $(6, 4)$, exist, so we print 2.
5. Find the number of valid ordered pairs where i is in the path from node 5 to node 8 and j is in the path from node 5 to node 8. No such pair exists, so we print 0.