E. Penghulu

In District Fluffy, there are ***N*** villages (numbered ***1, 2, …, N***) and ***N - 1*** bidirectional streets connecting the villages. It is guaranteed that there is at least 1 way to travel from any village to another. All the streets are of the same length. Every village has a *penghulu* (Malay for village headman). In the spirit of democracy, the *penghulus* (plural for penghulu) take turns to be the *district leader.*

The state government requires every resident to pay a tax of $1 per resident. Each *penghulu* (including the district leader) is willing to collect tax money from all the residents of their own village.

However, due to work commitment, each *penghulu* (except the district leader) is only willing to travel to ***one village a street away from his village***. The district leader is only willing to travel to the state government's office which is outside the district.

Therefore, each *penghulu* (except the district leader) will travel to one neighbouring village to pass all the tax money he has collected to the neighbouring *penghulu*. The *penghulu* of village *i* should only begin travelling when he has collected the tax money from all of the residents of village *i* and from all of the *penghulus* who wish to travel to village *i*.

The penghulus want to investigate how the tax collection process varies with whom the district leader is for the year. More concretely, you are required to answer ***Q*** queries of the form **(*p*, *q*)**, which signifies:

*"Given that penghulu **p** is the district leader for the year, how much tax money will penghulu **q** have to collect before travelling? If **q** is the district leader, you should output the total tax money collected in the district (since the tax money of everyone in the district must eventually be collected by the district leader before he travels to the government council's office)".*

See the sample input for a detailed explanation.

Input Format

- The first line contains two integer ***N*** and ***Q*** denoting the number of villages and the number of queries, respectively.
- The second line contains ***N*** space-separated integers $w_1, w_2, \ldots, w_N$ denoting the number of residents in each village.

- The next ***N-1*** lines contain two integers ***u*** and ***v*** each denoting a road between villages ***u*** and ***v***.
- The next ***Q*** lines contain two integers ***p*** and ***q*** denoting a single query.

Output Format

Output ***Q*** lines, each a single integer denoting the answer to the query.

Constraints

For all test cases, $2 \leq N \leq 100,000$, $1 \leq Q \leq 200,000$, $1 \leq w_i \leq 10,000,000$

Subtask 1 (40 points) : $2 \leq N \leq 1,000$, $1 \leq Q \leq 1000$, $1 \leq w_i \leq 10,000$
Subtask 2 (40 points) : ***p*** is the same value for all queries, $Q \leq N$, $1 \leq w_i \leq 10,000$
Subtask 3 (70 points) : ***q*** is the same value for all queries, $Q \leq N$, $1 \leq w_i \leq 10,000$
Subtask 4 (150 points) : No additional constraints apply

Sample Input 1

```
5 5
3 1 4 1 5
1 2
1 3
2 4
2 5
2 1
5 1
1 4
2 5
5 4
```

Sample Output 1

```
7
7
1
5
1
```

Explanation 1

We provide explanation for the first query (2, 1) as follows. The district leader is the *penghulu* of village 2, and we want to find out how much tax money the *penghulu* of village 1 has to collect before travelling to another village a street away.

1. Village 4 and village 5 is only adjacent to village 2. *Penghulu* 4 and *penghulu* 5 collects money from their villages ($1 and $5) respectively and passes it to *penghulu 2*.
2. *Penghulu* 2 collects money from village 2 ($1) so he now has $1+$5+$1=$7.
3. Village 3 is only adjacent to village 1. *Penghulu* 3 collects money from village 3, ($4) and gives it to *penghulu* 1.
4. *Penghulu* 1 collects money from village 1 ($3) so that he now has $4+$3 = $7. *Penghulu* 1 passes money to *penghulu* 2.
5. *Penghulu* 2 now has $7 (from step 2) and $7 (from step 4), so he collects $14.

Since *penghulu* 1 collects $7 in total, the answer to the first query is 7.