Dream and the Multiverse

Time limit: 5.0s   **Memory limit:** 256M

> *I have gone over the scenarios in my head,*
>
> *and there are 6.96969 billion outcomes, and only one of them -*
>
> *- do I win.*

source

Dream abstracts the fabric of spacetime as a directed rooted tree (arborescence) with N nodes (numbered 1 through N). Node 1 is the root and for each i $(1 \leq i \leq N - 1)$, the parent of node $i + 1$ is f_i. All edges of this tree are directed away from the root.

Then, Dream employs a magical superpower and adds M directed edges to this tree in such a way that the resulting directed graph remains acyclic (a DAG).

Let's call a node of this DAG an *event* and further call a simple path on this DAG an *era*. Dream considers a pair of events (i, j) to be *plausible* if there is an era whose first event is i and last event is j.

Dream now wants you to answer Q queries. In each query, he gives you two positive integers l and r, where $l \leq r$, and he wishes to know the number of plausible pairs of events (i, j) such that $l \leq i, j \leq r$.

Constraints

$2 \leq N \leq 10^5$

$0 \leq M \leq 10^5$

$1 \leq Q \leq 10^6$

The given tree and M extra edges form a DAG.

Subtask 1 [1%]

The tree is a line graph.

Subtask 2 [11%]

$N, M, Q \leq 10^3$

Subtask 3 [7%]

$M \leq 5$

Subtask 4 [23%]

$N, M, Q \leq 5 \times 10^4$

Subtask 5 [17%]

$Q \leq 10^5$

Subtask 6 [41%]

No additional constraints.

Input Specification

The first line of the input contains two integers N and M.

The second line contains $N - 1$ integers $f_1, f_2, \ldots, f_{N-1}$.

M lines follow. Each of these lines contains two integers u and v describing an additional edge from node u to node v.

The following line contains a single integer Q.

Q lines follow. Each of these lines contains two integers l and r describing a query.

Output Specification

For each query, print a single line containing one integer — the number of plausible pairs (i, j) such that $l \leq i, j \leq r$.

Sample Input

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

Sample Output

```
6
5
27
```