Ape War

On planet Earth, the apes are planning a mutiny against the humans. There are N apes, where each ape is uniquely numbered in $[1, N]$ and the chief ape is numbered 1. Each ape (except the chief) has 1 direct superior, and each ape (including the chief) has 0 or more subordinates. There will be no cycle in this hierarchy, i.e., if x is direct or indirect superior to y, then y can't be superior to x.

Some cunning humans have infiltrated this group. Since they are always wearing a technologically advanced camouflage, it is impossible for apes to distinguish these humans from themselves. All humans entered at the same time, therefore their identification numbers always lie in a given range. That is their identification numbers always lie in the range $[l, r]$.

Apes always transfer some secret message between themselves. An ape is authorized to communicate with its direct superiors or any of its direct subordinates. Message transmission will be done such that it always passes through the least number of intermediate apes (or humans disguised as apes).

You are given structure of this group, and M messages need to be transferred. For each message, you are given identification number of source and destination ape and the range of human identification numbers. Find out how many apes in the path (including source and destination) are humans.

Input
First line contains two space separated numbers, NM, representing total number of apes in the group and number of messages which needed to be transferred respectively.
Second line contains $N-1$ space separated integers, $p_2, p_3, \ldots, p_N$, where p_i is the parent of ith ape for $i \in [2, N]$.
Then follows M lines, each representing a query.
Each query contains four space separated integers, x, y, l, r, that is, a message is transferred from ape x to ape y and the range of identification number of disguised humans is $[l, r]$.

Output
For each query, print an integer that represents the total number of humans in this message path.

Constraints
$2 \leq N \leq 5 \times 10^4$
$1 \leq M \leq 5 \times 10^4$
$1 \leq p_i < i, where\ i \in [2, N]$
$1 \leq x, y \leq N, x \neq y$
$1 \leq l \leq r \leq N$

Sample Input

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

Sample Output

```
2
0
1
4
```

Explanation
Hierarchical structure of the mutiny looks like

```
    1
   / \
  2   3
 /\   \
4  5   6
```

Query #1: Here message will go through $7 \to 5 \to 2 \to 1 \to 3 \to 6$ and the range for humans is $[2,4]$. So possible humans who will be tapping this message are $\#2, \#3$.

Query #2: Message will go through $8 \to 5 \to 7$, while humans have id number between $[1,4]$. So there will be no humans tracing this message.

Query #3: Message path is $5 \to 2$. Here sender is human as his id is in range $[1,6]$.

Query #4: Message flow path is $8 \to 5 \to 2 \to 4$, and apes with id in range $[1,8]$ are disguised humans. All the 4 apes in path are humans.