

Problem F: Flip Path on Rooted Tree

- Time Limit: 2 sec

Problem Statement

You are given a rooted tree with N vertices, with vertex 1 as the root. The parent of vertex i ($2 \leq i \leq N$) is vertex p_i . Each vertex has a value of either 0 or 1 written on it, and initially, vertex i ($1 \leq i \leq N$) has the value a_i written on it.

You need to handle Q queries. The i -th query ($1 \leq i \leq Q$) is as follows:

- If the value written on vertex x_i is 0 , change it to 1 ; if it is 1 , change it to 0 . After that, output the answer to the following problem:
 - Find the minimum number of operations required to make all vertices have the value 0 by repeatedly performing the following operation:
 - Select a vertex. For every vertex on the path from vertex 1 to the selected vertex (inclusive), change the value to 1 if it is 0 , and to 0 if it is 1 .

It can be proved that this can be achieved in a finite number of operations.

Input

The input is given in the following format:

```
 $N$   
 $p_2 p_3 \dots p_N$   
 $a_1 a_2 \dots a_N$   
 $Q$   
 $x_1$   
 $x_2$   
 $\vdots$   
 $x_Q$ 
```

- $2 \leq N \leq 200,000$
- $1 \leq Q \leq 200,000$
- $1 \leq p_i < i$ ($2 \leq i \leq N$)
- $0 \leq a_i \leq 1$ ($1 \leq i \leq N$)
- $1 \leq x_i \leq N$ ($1 \leq i \leq Q$)
- All input values are integers.

Output

Output Q lines. On the i -th line, output the answer to the i -th query.

Sample Input	Sample Output
4 1 1 3 0 1 1 0 3 2 1 4	2 1 1