

## 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