IOITC 2019
Team Selection Test 2

Tree Profit

You're given a tree with N nodes, numbered from 1 to N. It is rooted at 1. You start at the root node. If you go down (away from the root) one edge, you pay C coins. If you go up one edge, you get D coins.

For every node u, you can enter this node (from up or down) a maximum of A_u times. For every leaf, find the maximum amount of money you can make on a walk starting from node 1 and ending at that leaf (may be negative). The problems are independent for each leaf.

Note that the root is never considered to be a leaf node. And when you start from node 1, it is not considered as entering this node, and hence is not considered towards the A_1 count.

Input

- The first line contain three space-separated integers - N, C and D.
- The next line contains $N-1$ integers - P_2, P_3, ..., P_N, where P_i is the parent of node i ($1 \leq P_i < i$).
- The next line contains N integers - A_1, A_2, ..., A_N.

Output

For each leaf node in the tree, output a line containing the answer for this leaf. Print the values in increasing order of leaf indices.

Constraints

- $2 \leq N \leq 10^5$
- $0 \leq C < D \leq 10^6$
- $1 \leq A_u \leq 10^6$

Subtasks

- Subtask 1: 30%: The tree is a straight chain ($P_i = i - 1$)
- Subtask 2: 38%: $N \leq 10^3$
- Subtask 3: 32%: Original Constraints

Sample Input 1

```
3 5 6
1 2
1 2 2
```

Sample Output 1

```
-9
```

Explanation 1

One possibility is to take the walk $1 \to 2 \to 3 \to 2 \to 3$. In this walk, we enter 1 zero times, enter 2 two times and enter 3 two times. Hence this is a valid path. The number of coins you have at the end is $-5 - 5 + 6 - 5 = -9$.
Another walk you can take is $1 \to 2 \to 1 \to 2 \to 3$. In this walk, we enter 1 one time, enter 2 two times and enter 3 one time. Hence this is a valid path. The number of coins you have at the end is $-5 + 6 - 5 - 5 = -9$.
You can check that you cannot end up at 3 with more than -9 coins. Hence the answer is -9.

Sample Input 2

```
7 5 12
1 2 1 4 4 6
1 2 1 1 2 1 3
```

Sample Output 2

```
-3
4
-1
```