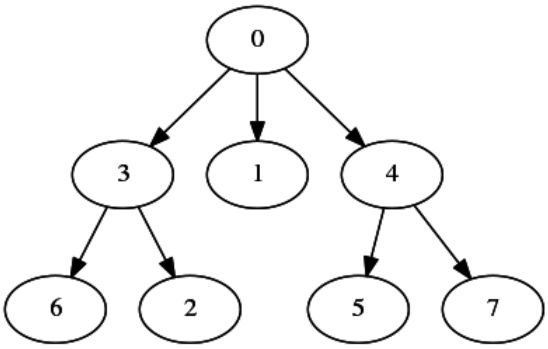
Summing in a Tree

You have a directed tree with n nodes numbered $0, 1, 2, \ldots, n-1$ that is rooted at node 0. A *directed tree* means that all edges are directed and point *away* from the root node. For example, the diagram below depicts a directed tree with $n = 8$ nodes:



We define:

- $\text{level}(u)$ as the edge distance between node u and the root node.
- the *height*, h, of the tree as the maximum level of any node.
- $\text{subtree}(u)$ as the set of nodes reachable from node u (note that this includes node u).
- $f(l, k)$ as the number of nodes v such that $\text{subtree}(v)$ contains at least k nodes whose level is l.

  More formally, suppose we define $S_{v,l}$ as the set $\{u \in \text{subtree}(v) \mid \text{level}(u) = l\}$. Then $f(l, k)$ is the number of nodes v such that $|S_{v,l}| \geq k$.

Given the numbers $a_0, a_1, a_2, \ldots, a_h$, find and print the result of:

$$\sum_{i=0}^{h} f(i, a_i)$$

Input Format

The first line contains two space-separated integers describing the respective values of n (the number of nodes in the tree) and h (the height of the tree).
The second line contains $n-1$ space-separated integers describing the respective values of $p_1, p_2, \ldots, p_{n-1}$, where each p_i is the node ID of node i's parent node. In other words, each p_i defines a directed edge from p_i to i.
The third line contains $h+1$ space-separated integers describing the respective values of $a_0, a_1, \ldots, a_h$.

Constraints

- $1 \leq n \leq 5 \times 10^5$
- $0 \leq h < n$
- $0 \leq p_i < n$
- $0 \leq a_i \leq n$
- It is guaranteed that the input defines a valid directed tree.
- h is the height of the tree.

Scoring

This challenge uses *binary* scoring, so you *must* pass all test cases to earn a positive score.

Output Format

Print a single integer denoting $\sum_{i=0}^{h} f(i, a_i)$.

Sample Input 0

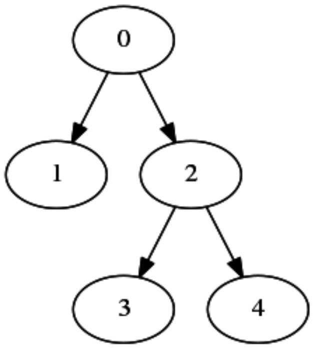
```
5 2
0 0 2 2
0 1 2
```

Sample Output 0

```
10
```

Explanation 0

The following illustrates the tree in the sample input:



The levels of the nodes are as follows:

u	0	1	2	3	4
$\text{level}(u)$	0	1	1	2	2

Now,

- $f(0, a_0) = f(0, 0) = 5$ because nodes 0, 1, 2, 3 and 4 contain at least $a_0 = 0$ nodes in their subtrees whose level is 0.
- $f(1, a_1) = f(1, 1) = 3$ because nodes 0, 1 and 2 contain at least $a_1 = 1$ node in their subtrees whose level is 1.
- $f(2, a_2) = f(2, 2) = 2$ because nodes 0 and 2 contain at least $a_2 = 2$ nodes in their subtrees whose level is 2.

Thus, the answer is $5 + 3 + 2 = 10$.