

## Problem K

# Tree Beauty

There is a rooted tree of  $N$  vertices, numbered from 1 to  $N$ . Vertex 1 is the root of the tree, while  $P_i$  is the parent of vertex  $i$ , for all  $2 \leq i \leq N$ . Each vertex has a beautiness value, which is initially 0.

You can use a special machine that can increase the beautiness value of the vertices. By giving three parameters  $X$ ,  $Y$ , and  $K$  to the machine, the machine will increase the beautiness value of all vertices in the subtree of vertex  $X$ . If vertex  $X'$  is in the subtree of vertex  $X$ , then its beautiness value will increase by  $\lfloor \frac{Y}{K^d} \rfloor$ , where  $d$  is the number of edges in the path connecting vertex  $X$  to vertex  $X'$ . For example, the beautiness value of vertex  $X$  will increase by  $Y$ , the beautiness value of all children of vertex  $X$  will increase by  $\lfloor \frac{Y}{K} \rfloor$ , the beautiness value of all children of vertex  $X$ 's children will increase by  $\lfloor \frac{Y}{K^2} \rfloor$ , and so on.

You are going to perform  $Q$  operations one by one. Each operation is one of the following types.

1. Use the special machine by giving three parameters  $X$ ,  $Y$ , and  $K$  to the machine.
2. Report the total beautiness value of all vertices in the subtree of vertex  $X$ .

For each operation of the second type, output the total beautiness value of all vertices in the subtree of vertex  $X$ .

### Input

Input begins with a line containing two integers:  $N$   $Q$  ( $1 \leq N, Q \leq 100\,000$ ) representing the number of vertices and the number of operations, respectively. The next line contains  $N - 1$  integers:  $P_i$  ( $1 \leq P_i < i$ ) representing the parent of vertices  $i \in [2, N]$ ; note that  $i$  starts from 2. The next  $Q$  lines each contains one of the following input format representing the operation you should perform.

- 1  $X$   $Y$   $K$  ( $1 \leq X \leq N; 1 \leq Y, K \leq 100\,000$ )  
Use the special machine by giving three parameters  $X$ ,  $Y$ , and  $K$  to the machine.
- 2  $X$  ( $1 \leq X \leq N$ )  
Output the total beautiness value of all vertices in the subtree of vertex  $X$ .

There will be at least one operation of the second type.

### Output

For each operation of the second type in the same order as input, output in a line an integer representing the total beautiness value of all vertices in the subtree of vertex  $X$ .

### Sample Input #1

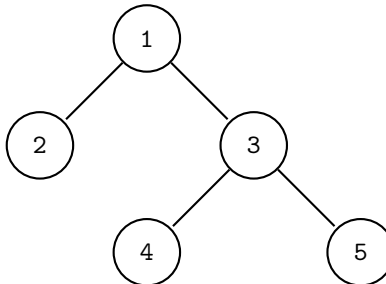
```
5 5
1 1 3 3
1 1 99 2
2 1
2 3
1 3 2 3
2 3
```

### Sample Output #1

```
245
97
99
```

*Explanation for the sample input/output #1*

The tree is illustrated by the following image.



- The first operation increases the beautiness values of vertex 1 by 99, vertex 2 and 3 by 49, and vertex 4 and 5 by 24.
- The total beautiness value of all vertices in the subtree of vertex 1 is  $99 + 49 + 49 + 24 + 24 = 245$ .
- The total beautiness value of all vertices in the subtree of vertex 3 is  $49 + 24 + 24 = 97$ .
- The fourth operation increases the beautiness values of vertex 3 by 2 and vertex 4 and 5 by 0.
- The total beautiness value of all vertices in the subtree of vertex 3 is  $51 + 24 + 24 = 99$ .