

Not so fast

Tree is described in the input . At the beginning in each node 0 is written . Then comes M queries .

There are 2 types of queries :

1 v x - increase the number in node v by x.

2 a b - write the sum of numbers on the simple path from a to b.

Input

On the first line N is written .

Then comes N-1 numbers(from 1 to N-1) . ith of them is the parent of (i+1)th node .

Then enters number M .

After it comes M lines. each one describes the single query.

Output

Write the answer for each 2nd type of query.

Example

Input:

3

1

1

2

1 1 5

2 1 2

Output:

5

Edges are : 1-2 , 1-3 . After increasing the number of node 1 by 5 , sum on the path from 1 to 2 becomes 5.

Constraints

$1 \leq N \leq 100000$

$1 \leq M \leq 200000$

$1 \leq a, b, v \leq N$

$1 \leq x \leq 1000$