

G. The Awesomest Vertex

time limit per test: 5 seconds
 memory limit per test: 256 megabytes
 input: standard input
 output: standard output

You are given a rooted tree on n vertices. The vertices are numbered from 1 to n ; the root is the vertex number 1.

Each vertex has two integers associated with it: a_i and b_i . We denote the set of all ancestors of v (including v itself) by $R(v)$. The *awesomeness* of a vertex v is defined as

$$\left| \sum_{w \in R(v)} a_w \right| \cdot \left| \sum_{w \in R(v)} b_w \right|,$$

where $|x|$ denotes the absolute value of x .

Process q queries of one of the following forms:

- 1 v x — increase a_v by a positive integer x .
- 2 v — report the maximum *awesomeness* in the subtree of vertex v .

Input

The first line contains two integers n and q ($1 \leq n \leq 2 \cdot 10^5, 1 \leq q \leq 10^5$) — the number of vertices in the tree and the number of queries, respectively.

The second line contains $n - 1$ integers p_2, p_3, \dots, p_n ($1 \leq p_i < i$), where p_i means that there is an edge between vertices i and p_i .

The third line contains n integers a_1, a_2, \dots, a_n ($-5000 \leq a_i \leq 5000$), the initial values of a_i for each vertex.

The fourth line contains n integers b_1, b_2, \dots, b_n ($-5000 \leq b_i \leq 5000$), the values of b_i for each vertex.

Each of the next q lines describes a query. It has one of the following forms:

- 1 v x ($1 \leq v \leq n, 1 \leq x \leq 5000$).
- 2 v ($1 \leq v \leq n$).

Output

For each query of the second type, print a single line with the maximum *awesomeness* in the respective subtree.

Example

input

Copy

```
5 6
1 1 2 2
10 -3 -7 -3 -10
10 3 9 3 6
2 1
2 2
1 2 6
2 1
1 2 5
2 1
```

Codeforces Global Round 4

Contest is running

00:44:05

Contestant



→ Submit?

Language: Python 3.7.2
 Almost always, if you send a solution on PyPy, it works much faster

Choose file: Choose File No file chosen

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

→ Score table

	Score
Problem A	332
Problem B	498
Problem C	830
Problem D	1162
Problem E	1328
Problem F1	996
Problem F2	996
Problem G	2158
Problem H	2656
Successful hack	100
Unsuccessful hack	-50
Unsuccessful submission	-50
Resubmission	-50

* If you solve problem on 01:45 from the first attempt

output

Copy

```
100
91
169
240
```

Note

The initial *awesomeness* of the vertices is $[100, 91, 57, 64, 57]$. The most *awesome* vertex in the subtree of vertex 1 (the first query) is 1, and the most *awesome* vertex in the subtree of vertex 2 (the second query) is 2.

After the first update (the third query), the *awesomeness* changes to $[100, 169, 57, 160, 57]$ and thus the most *awesome* vertex in the whole tree (the fourth query) is now 2.

After the second update (the fifth query), the *awesomeness* becomes $[100, 221, 57, 240, 152]$, hence the most *awesome* vertex (the sixth query) is now 4.

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