Funding Problems

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Nowadays, some countries follow very unusual ways of distributing funds to its cities and regions. During her stay in Ostrichia, Menlo learned how this task is done there. She found it particularly weird. It is done in the following way:

The country contains N cities and M regions. Each city belongs to **exactly one** region. Cities and regions are numbered from 1 to N and from 1 to M, respectively. With the exception of region 1, each of the regions $2, 3...M$ report to **exactly one** other region. Since region 1 is the capital region, it does not report to any other region. No region reports to itself. The reporting system is a tree rooted at region 1, with each region (node) reporting directly to another region which itself reports to another one until, eventually, region 1 is reached.

Funding distribution is then defined recursively. If some region x receives an amount of funding (money) v, then the amount of money in the central bank of each city in region x (if any) increases by v. After that, the same amount v is passed to each of the other regions y that directly report to region x. Region y receives the funds then does the same thing again. If some region does not have any other regions that report to it, it simply does not pass the amount it received to any other region and the process stops.

Ostrichia is a very weird country. Sometimes, cities get tired of the current region they belong to, and decide to move and settle in a totally different region (in Ostrichia of course). The Ostrichian government does not like when this happens because it makes the funding distribution process more complicated.

Menlo is such a curious girl, so she decided to keep track of the amount of money in the central bank of each city. She was overwhelmed by the number of regions, cities, and region changes in Ostrichia, so she asked you to write a program that simulates the process. Please help Menlo!

Input

The first line of input contains three space separated integers N, M and Q ($1 \leq N, M, Q \leq 2 \times 10^5$), the number of cities, regions, and actions your program should perform, respectively.

The next line contains N space separated integers in the range $[1, M]$. The i^{th} ($1 \leq i \leq N$) integer on this line denotes the number of the region that city i belongs to.

The next line contains $M-1$ space separated integers in the range $[1, M]$. The i^{th} ($1 \leq i \leq M-1$) integer on this line denotes the number of the region that region $i+1$ reports to.

Each of the following Q lines contains two or three space separated integers. The first of these three integers is t ($1 \leq t \leq 3$) the type of action your program must perform. If t is 1, two integers x and v ($1 \leq x \leq M, 1 \leq v \leq 10^7$) follow meaning the region number x receives funding v. If t is 2, two integers u and x ($1 \leq u \leq N, 1 \leq x \leq M$) follow meaning city u moved to region x. If t is 3, one integer u ($1 \leq u \leq N$) follows asking you to output the amount of funding (money) in city u's central bank at that moment. Initially, all central banks of all cities have an amount of 0 funds in them.

Output

For each action of type 3, output on a separate single line the answer to that query.

Scoring

In 30% of test cases: ($1 \leq N, M, Q \leq 4 \times 10^3$)

In the second 30% of test cases: Only queries of type 1 and 3 are asked (Static cities)

Example

standard input	standard output
6 5 5 1 2 3 4 4 5 1 1 3 3 1 3 2 2 5 2 3 2 1 2 1 3 5	0 3

Note

It is possible for a region to be empty, i.e. not have any cities in it. **This does not affect the fund distribution process**.