

Tourists

Problem Name	Tourists
Input file	standard input
Output file	standard output
Time limit	4 seconds
Memory limit	256 megabytes

There are n cities in Utopia, numbered from 1 through n . There are also $n - 1$ two-way roads connecting the cities. It is possible to travel between each pair of cities using only these roads. Because Utopia is very beautiful, there are m tourists, numbered from 1 through m , who are currently visiting this country. Initially, the i^{th} tourist is visiting city a_i . It is possible that multiple tourists are in the same city; that is, it can be that $a_i = a_j$ for a pair i, j such that $i \neq j$.

Each tourist has an opinion on how interesting their current visit in Utopia is, represented as a number. Initially each tourist's opinion is 0. In order to encourage further visits, Utopian government wants to increase the tourists' opinion of the country by organizing events in selected cities. When an event is held in city c , all tourists who are currently staying there will have their opinion increased by d , where d is a value depending on the type of the event.

Some of the tourists have planned to travel between cities during their stay in Utopia. Although traveling from one city to another takes almost no time (thanks to efficient Utopian roads), it still is an inconvenience and thus results in a lower tourist opinion. To be exact, a tourist who traveled a path consisting of k roads will have their opinion decreased by k (tourists will always choose the shortest path between two cities).

You are asked by the Utopian government to track the tourists' opinions, as they travel through the country. As part of this request, you will be given q queries as part of the input. You are supposed to carry out and answer all queries in the order they appear in the input.

Input

The first line contains three integers n, m, q ($2 \leq n \leq 200\,000$, $1 \leq m, q \leq 200\,000$) - number of cities, tourists and queries, respectively.

The second line contains m integers a_1, a_2, \dots, a_m ($1 \leq a_i \leq n$), where a_i represents the starting city of the i^{th} tourist.

Next $n - 1$ lines contain 2 integers each: v_i and w_i ($1 \leq v_i, w_i \leq n, v_i \neq w_i$) implying that there exists a road between city v_i and w_i .

Next q lines describe queries in the order they are asked. Each line is in one of the following three forms:

- The letter 't' followed by three integers f_i, g_i, c_i ($1 \leq f_i \leq g_i \leq m, 1 \leq c_i \leq n$), meaning that all tourists with numbers from f_i to g_i (inclusively) travel to city c_i . Those who are already in city c_i do not move, and their opinion does not change.
- The letter 'e' followed by two integers c_i, d_i ($1 \leq c_i \leq n, 0 \leq d_i \leq 10^9$), meaning that in city c_i , an event is being held that increases the tourists' opinion by d_i .
- The letter 'q' followed by one integer v_i ($1 \leq v_i \leq m$), representing a question about the current opinion of the tourist v_i .

It is guaranteed that there is at least one 'q' query in the input.

Output

Print the answer for all 'q' queries, each in a separate line, in the order they were asked.

Scoring

Subtask 1 (10 points): $n, m, q \leq 200$

Subtask 2 (15 points): $n, m, q \leq 2\,000$

Subtask 3 (25 points): $m, q \leq 2\,000$

Subtask 4 (25 points): No 'e' queries

Subtask 5 (25 points): No additional constraints

Example Input

8 4 11

1 4 8 1

6 4

6 3

3 7

6 5

5 1

1 2

1 8

q 4
t 3 4 5
t 2 2 7
q 4
e 5 10
e 1 5
q 4
t 1 1 5
t 2 2 1
q 1
q 2

Example Output

0
-1
9
4
-7