Problem G: Sprinkles the Domino Destructor

Filename: `sprinkles`
Time limit: `4 seconds`

Justin used to love setting up domino runs when he was younger! Each domino would have a certain number of pips on it, and he would stack up dominos in a line on the island in his home, one by one, each right next to the other. Each pair of adjacent dominos would be close enough so that if one domino were to topple, a chain reaction would start, eventually knocking over each and every domino in the direction it fell until it reached an already knocked over domino, at which point the chain reaction would end.

Of course, Justin would like to set off this reaction himself, but occasionally they would topple for reasons out of anyone's control. Therefore, Justin bought several stoppers that, when placed between any two dominos, prevent the continuation of any chain reaction from passing through. In other words, if there is a stopper between dominos **i** and **i + 1**, and domino **i** is falling to the right, the stopper will prevent domino **i + 1** from toppling and will thus stop the chain reaction. The same is also true in the opposite direction: if domino **i + 1** is falling to the right, the stopper will prevent domino **i** from falling.

Unfortunately for the dominos, Justin's household had plenty of cats! One of his cats in particular – Sprinkles – just loved to knock stuff over. It stands to reason that, when unsupervised, Sprinkles would jump on the island at the first chance he got and begin knocking over dominos at random! Sometimes, Justin would hear this happen and would come back and reset all of the dominos so they were standing upright again in their original positions.

Justin has gotten used to this after many years of living with cats. However, he has an interesting question he wants you to solve...

Problem

Given a line of dominos, the number of pips on each domino, the location of the stoppers, and information on the events that happen to the dominos, please determine the sum of the pips of the dominos knocked over for each chain reaction Sprinkles causes.

Input

The first line of input contains one integer **c**, representing the number of test cases.

The first line of each test case contains 3 integers **n**, **m**, and **q**, representing the number of dominos in the run Justin has set up, the number of stoppers placed down, and the number of dominos Sprinkles topples, respectively. The next line of each test case contains **n** integers, the $\mathbf{i}^{\mathbf{th}}$ of which is $\mathbf{p_i}$, representing the number of pips on the $\mathbf{i}^{\mathbf{th}}$ domino.

The following line contains **m** integers, the $\mathbf{i}^{\mathbf{th}}$ of which is $\mathbf{s_i}$, representing stopper **i** being placed between domino $\mathbf{s_i}$ and $\mathbf{s_i + 1}$.

Finally, there are **q** lines that follow. Each line will either be "**1** $\mathbf{x_i}$ $\mathbf{d_i}$" (Sprinkles knocking over domino $\mathbf{x_i}$ in the $\mathbf{d_i}$ direction), or "**2**" (Justin resetting the dominos). For each query of type 1, it is guaranteed that Sprinkles will be knocking over a domino that is still standing. For the action of type 2, **all** n dominos are set to be standing again.

Output

For each query of type 1, on a line by itself, output the number of dominos that get knocked over with Sprinkles action.

Input Bounds and Corresponding Credit

40 Points	60 Points
• $1 \le \mathbf{c} \le 20$ • $0 \le \mathbf{m} < \mathbf{n} \le 10^3$ • $1 \le \mathbf{q} \le 100$ • $1 \le \mathbf{p_i} \le 12$ • $1 \le \mathbf{s_i} < n$ • $1 \le \mathbf{x_i} \le n$ • $\mathbf{d_i} \in$ { 'L', 'R' }	• $1 \le \mathbf{c} \le 30$ • $0 \le \mathbf{m} < \mathbf{n} \le 10^5$ • $1 \le \mathbf{q} \le 10^4$ • $1 \le \mathbf{p_i} \le 12$ • $1 \le \mathbf{s_i} < n$ • $1 \le \mathbf{x_i} \le n$ • $\mathbf{d_i} \in$ { 'L', 'R' }

Samples

Input	Output
2 6 1 4 3 4 2 5 7 1 4 1 2 R 1 1 R 2 1 2 R 5 0 3 1 1 1 1 1 1 2 L 1 4 R 1 3 L	11 3 11 2 2 1

Sample Explanation

In the first sample, domino #2, #3 and #4 are knocked over as there is a stopper after domino 4, the sum of these dominos is 4 + 2 + 5 = 11. When domino #1 is then knocked over, it's the only one that falls since domino #2 had previously fallen. After the reset, dominos #2, #3 and #4 fall

again. In the second sample, Sprinkles first knocks over dominos #2 and #1, then she knocks over dominos #4 and #5, and finally she knocks over domino #3.