

Problem H

Soldiers

Time Limit: 1 second

Memory Limit: 512 megabytes



Phidang is the leader of N soldiers. One day, the whole team has to prepare for a mock battle. They have to move along the places indexed from $-1,000,000,000$ to $1,000,000,000$. One place is marked as X , where the destination is.

Then, one by one, the i^{th} soldier ($1 \leq i \leq N$), starting from position a_i , has to move to the destination in the smallest number of turns. A soldier can only move from place y to the place $y + j$ or $y - j$ at the j^{th} turn (if the two places are still in the above range).

Phidang wants to know the total number of turns that all of his soldiers need to move. Given that, a supervisor of Phidang changes the team member positions or the destination X all the time, so please help him to compute the sum of the turns needed after each command from Phidang' supervisor.

Input

The first line contains two integers N ($1 \leq N \leq 5000$) - the number of soldiers, and X - the initial destination.

The second line contains N integers, the integer a_i ($1 \leq a_i \leq 10^6$) is the initial position of the i^{th} soldier.

The third line contains a single integer M ($1 \leq M \leq 10^6$) - The number of time that Phidang' supervisor commands.

In the next M lines, each line can be one of two following formats:

- $1 \ x \ y$: change a position of soldier x to y ($1 \leq x \leq N, 1 \leq y \leq 10^6$) (assign $a_x = y$)
- $2 \ Y$: change the destination to Y ($1 \leq Y \leq 10^6$) (assign $X = Y$)

Output

The output contains M integers, line i presents the total number of turns needed after each command.

Sample Input

Sample Output

2 1	2
9 11	4
2	
2 10	
1 1 12	

Explanation:

After the first command, $X = 10$. The first soldier moves from 9 to 10, the second soldier moves from 11 to 10. The total number of moves is 2.

After the second command, $a_1 = 12$. The first soldier moves from 12 to 11 then to 13 and finally reaches 10. The second soldier moves from 11 to 10. The total number of moves is 4.