Union of Segments

Time: 2 sec / Memory: 256 MB

Problem Statement

Given n distinct numbers $a_1 < a_2 < \cdots < a_n$ in the 1-D line and an initial multiset $A := \emptyset$,
your task in this problem is to process a sequence of queries of the following three types:

1. Insert a segment $[a_i, a_j]$ for some $1 \leq i < j \leq n$ into A.
2. Delete a segment $[a_i, a_j]$ for some $1 \leq i < j \leq n$ from A.
3. Report the length of $[a_i, a_j] \cap I$ for some $1 \leq i < j \leq n$,
   where $I := \bigcup_{I' \in A} I'$ is union of the segments in A.

You may assume that, in the input data,
a delete operation only takes place on segments that are already in A.

Input

The first line contains an integer n, the number of distinct numbers to input.
The second line contains n integers $a_1 < a_2 < \cdots < a_n$, in increasing order.
The third line contains an integer q, the number of queries.
Then there are q lines, each representing a query.

Each query is described by a string s and two integers i, j,
where s can be either "insert", "delete", or "report",
and i and j are the indexes of the segment for the query.

Output

For each of the "report" query on $[a_i, a_j]$,
output the length of $[a_i, a_j] \cap I$, where I is the union of the segments in A.

Constraints

- $2 \leq n \leq 10^5$

- $1 \leq q \leq 10^5$
- $-10^9 \leq a_i \leq 10^9$
- $s \in$ {"insert", "delete", "report"}.
- $1 \leq i < j \leq n$

Example

Input1:

```
7
1 3 6 7 10 13 15
8
insert 1 2
insert 3 5
insert 4 6
report 1 7
report 2 7
delete 3 5
report 1 7
report 2 7
```

Output1:

```
9
7
8
6
```