

DMOPC '16 Contest 3 P6 - Long Lost Love

Recently **Phoenix1369** revisited his long lost love, [Segment Tree Test](#). After a long battle with his feelings, he realized he could no longer keep them bottled up.

After many sleepless nights of browsing the internet, he finally came up with the [problem](#). However, try as he might, the solution of the problem did not meet his standards, nor did they meet those of the other [contestants](#).

Being extremely **persistent**, **Phoenix1369** has decided to try once more in projecting his emotions onto his problems. Please free him from the burden of his emotions by answering the following queries:

- `U poz val` - Change the value from position `poz` to value `val`.
- `G x` - Revert to reversion `x`.
- `P x y` - Output the maximum prefix sum on the interval from `x` to `y`.
- `S x y` - Output the maximum suffix sum on the interval from `x` to `y`.

At this point in time, **Walle256** came along to make sure everything is going according to plan, and mentioned that a reversion is created when you receive a structure-changing query (`G` and `U`). The initial structure has the reversion index `0`.

Input Specification

On the first line of input you will find the integer N ($1 \leq N \leq 100000$), representing the size of the array.
On the second line of input you will find N space-separated integers, representing the initial array. It is guaranteed that the total sum of the given numbers does not exceed $2^{31} - 1$.
On the third line of input, you will find the integer Q ($1 \leq Q \leq 500000$), representing the number of queries.
On the next Q lines of input, you will find queries formatted as specified above.

Output Specifications

For each of the `P` and `S` queries, output its result on a single line by itself in order according to the input.

Sample Input

```
5
-1 -2 -3 -2 9
5
P 2 3
U 1 8
S 1 5
G 0
S 1 5
```

Sample Output

-2
10
9