Desks of Eternity

A new startup, ChronoCorp has recently become the most valuable tech company in the world. They give credit to their in-house innovation, the Desk Matrix™. Each desk comes equipped with an additional computer that stores the identities of everyone who worked at that desk. Employees quit, new ones are hired, sometimes they swap departments, and they can even be brought back. Each time, The DeskMatrix™ also stores a new version of their employee evaluation scores. ChronoCorp wants to conduct group evaluations on sets of desks to see what their combined evaluation scores are and how they differ between versions.

Input

The first line of each input will be the number of employees employed by ChronoCorp $n \leq 10^5$ and the number of commands $c \leq 10^5$. The next line will contain n integers representing employee evaluation scores $s \leq 10^9$, in order of their desks. The next c lines will have a command in one of the following formats.
- S for swap, followed by two integers i and j. The employees at these indices swap desks.
- R for replacement, followed by two integers i and s. The employee at desk i has been replaced with a new employee with evaluation score s.
- P for perfect, followed by an index i. The employee at the desk is replaced by the employee with the highest evaluation score to ever work at that desk.
- Q for query, followed by an inclusive range [i,j] and two integers a and b representing the different versions stored in the desk matrix. Both the range and versions are 1 indexed. For example, "Q 3 6 1 4" is requesting the employees from desk 3 through 6 in records 1 and 4.

Output

For each query, calculate the sum of the employee evaluations over the range in both versions, and output the absolute difference between them. The swap, replacement, and perfect commands do not have any output.

Sample

Input	Output
6 5	1
3 5 7 2 4 9	7
S 1 4	
Q 2 5 1 2	
R 6 1	
P 1	
Q 4 6 1 4	