Problem A

We maintain a database of the historical temperature data. For each of the days $i = 1, \ldots, n$ ($n \leq 100\,000$), we record the average temperature t_i (where t_i is an integer and $-50 \leq t_i \leq 50$). Occasionally, we need to correct an error and change one of the values. Also, we need to test the hypotheses of form "for $a \leq i \leq b$, the temperature is approximately $ci + d$"; to this end, we need to compute

$$\mathrm{dev}(a, b, c, d) = \sqrt{\frac{\sum_{i=a}^{b}(t_i - ci - d)^2}{b - a + 1}}.$$

Input and output

The first line contains the integer n, followed by n integers $t_1, \ldots, t_n$. Each of the following lines is of form

- "C i t": change t_i to t, or

- "D a b c d", where $1 \leq a \leq b \leq n$ are integers and c and d are real numbers, write out a single line containing the value of $\mathrm{dev}(a, b, c, d)$ rounded to two decimal places. It is guaranteed that this value is at most 100.

Example

Input:

```
3 1 2 3
D 2 3 0 4
C 2 3
D 1 3 0.5 1
```

Output:

```
1.58
0.71
```

Problem B

We have a sparse array of integers smaller or equal to 1000 in the absolute value, indexed by integers in $\{0, \ldots, 10^9\}$. There are at most $100\,000$ elements in this array. We want to be able to

- compute the sum of values indexed by integers in $\{a, \ldots, b\}$,

- add a given integer d ($|d| \leq 2000$) to all values indexed by integers in $\{a, \ldots, b\}$, outputing an error if any of the values becomes larger than 1000 in the absolute value (no values are changed if that is the case), and

- negate all values indexed by integers in $\{a, \ldots, b\}$.

Input and output

The first line contains the integer $n \leq 100\,000$. On each of following n lines, there are two integers i and v, indicating that the value in the array at index i is v. Each of the following lines is of form

- "S a b": write out a single line containing the sum of values indexed by integers in $\{a, \ldots, b\}$;

- "A a b d": add d to all values indexed by integers in $\{a, \ldots, b\}$ and write out a single line containing the string "OK"; if any value would become larger than 1000 in the absolute value, do not change any values and write out a single line containing the string "ERROR", instead;

- "N a b": negate all values indexed by integers in $\{a, \ldots, b\}$, do not write out anything.

Example

Input:

```
3
1000 100
10 10
2000 -100
S 20 2000
A 20 2000 901
A 20 2000 900
N 0 1300
S 20 2000
```

    Output:

```
0
ERROR
OK
-200
```