Matrix Summation

A N × N matrix is filled with numbers. BuggyD is analyzing the matrix, and he wants the sum of certain submatrices every now and then, so he wants a system where he can get his results from a query. Also, the matrix is dynamic, and the value of any cell can be changed with a command in such a system.

Assume that initially, all the cells of the matrix are filled with 0. Design such a system for BuggyD. Read the input format for further details.

Input

The first line of the input contains an integer **t**, the number of test cases. **t** test cases follow.

The first line of each test case contains a single integer **N** (1 <= **N** <= 1024), denoting the size of the matrix.

A list of commands follows, which will be in one of the following three formats (quotes are for clarity):

1. "SET x y num" - Set the value at cell (x, y) to num (0 <= x, y < **N**).
2. "SUM x1 y1 x2 y2" - Find and print the sum of the values in the rectangle from (x1, y1) to (x2, y2), inclusive. You may assume that x1 <= x2 and y1 <= y2, and that the result will fit in a signed 32-bit integer.
3. "END" - Indicates the end of the test case.

Output

For each test case, output one line for the answer to each "SUM" command. Print a blank line after each test case.

Example

Input:

```
1
4
SET 0 0 1
SUM 0 0 3 3
SET 2 2 12
SUM 2 2 2 2
SUM 2 2 3 3
SUM 0 0 2 2
END
```

Output:

```
1
12
12
13
```

Warning: large Input/Output data, be careful with certain languages