Mobile phones

PROBLEM

Suppose that the fourth generation mobile phone base stations in the Tampere area operate as follows. The area is divided into squares. The squares form an $S \times S$ matrix with the rows and columns numbered from 0 to S-1. Each square contains a base station. The number of active mobile phones inside a square can change because a phone is moved from a square to another or a phone is switched on or off. At times, each base station reports the change in the number of active phones to the main base station along with the row and the column of the matrix.

Write a program, which receives these reports and answers queries about the current total number of active mobile phones in any rectangle-shaped area.

INPUT AND OUTPUT

The input is read from standard input as integers and the answers to the queries are written to standard output as integers. The input is encoded as follows. Each input comes on a separate line, and consists of one instruction integer and a number of parameter integers according to the following table.

Instruction	Parameters	Meaning
0	S	Initialize the matrix size to $S \times S$ containing all zeros. This instruction is given only once and it will be the first instruction.
1	$X\ Y\ A$	Add A to the number of active phones in table square (X, Y). A may be positive or negative.
2	$L\ B\ R\ T$	Query the current sum of numbers of active mobile phones in squares (X,Y), where $L \le X \le R$, $B \le Y \le T$
3		Terminate program. This instruction is given only once and it will be the last instruction.

The values will always be in range, so there is no need to check them. In particular, if A is negative, it can be assumed that it will not reduce the square value below zero. The indexing starts at 0, e.g. for a table of size 4×4, we have $0 \le X \le 3$ and $0 \le Y \le 3$.

Your program should not answer anything to lines with an instruction other than 2. If the instruction is 2, then your program is expected to answer the query by writing the answer as a single line containing a single integer to standard output.

PROGRAMMING INSTRUCTIONS

In the examples below, the integer `last` is the last one to be read from a line, and `answer` is the integer variable containing your answer.

If you program in C++ and use `iostreams`, you should use the following implementation for reading standard input and writing to standard output:

```
cin>>last;
cout<<answer<<endl<<flush;
```

If you program in C or C++ and use scanf and printf, you should use the following implementation for reading standard input and writing to standard output:

```
scanf ("%d", &last);
printf("%d\n",answer); fflush (stdout);
```

If you program in Pascal, you should use the following implementation of reading standard input and writing to standard output:

```
Read(last); ... Readln;
Writeln(answer);
```

EXAMPLE

stdin	stdout	explanation
`0 4`		Initialize table size to 4×4.
`1 1 2 3`		Update table at (1,2) with +3.
`2 0 0 2 2`		Query sum of rectangle $0 \le X \le 2,\ 0 \le Y \le 2$.
	`3`	Answer the query.
`1 1 1 2`		Update table at (1, 1) with +2.
`1 1 2 -1`		Update table at (1, 2) with -1.
`2 1 1 2 3`		Query sum of rectangle $1 \le X \le 2,\ 1 \le Y \le 3$.
	`4`	Answer the query.
`3`		Terminate program.

CONSTRAINTS

Table size	$S \times S$	$1 \times 1 \le S \times S \le 1024 \times 1024$
Cell value V at any time	V	$0 \le V \le 2^{15}-1$ (= 32767)
Update amount	A	$-2^{15} \le A \le 2^{15}-1$ (= 32767)
No of instructions in input	U	$3 \le U \le 60002$
Maximum number of phones in the whole table	M	$M = 2^{30}$

Out of the 20 inputs, 16 are such that the table size is at most 512×512.

NOTE: The web test facility feeds your input file to your program's standard input.