11592   Bulb inside a Grid (II)

You are given a grid of size $N \times N$. Each cell in the grid incorporates a bulb which can be initially *on* or *off* depending on its position. A bulb located at i-th row and j-th column will be initially *off* if $i < j$ otherwise it will be *on*. The following figure shows a grid of dimension 6×6 in its initial configuration.

```
1 0 0 0 0 0
1 1 0 0 0 0
1 1 1 0 0 0
1 1 1 1 0 0
1 1 1 1 1 0
1 1 1 1 1 1
```

Here '1' indicates *on* state and '0' indicates *off* state.

A switch can cover a rectangular region in the grid. A switch, when pressed, toggles all the bulbs in its corresponding region (that is, all the bulbs that are *on* goes *off* and vice versa).

A switch is represented by four integers ($row, column, width, height$) where ($row, column$) denotes the top-left corner of the rectangular region and $width$ & $height$ are self-explanatory.

Here is a diagram that should extricate things.

```
1 0 0 0 0 0
1 1 0 0 0 0
1 1 1 0 0 0
1 1 1 1 0 0
1 1 1 1 1 0
1 1 1 1 1 1
```

The diagram shows a grid of size 6×6 with 3 switches in action.

There are 3 switches; (4, 3, 2, 2), (5, 5, 4, 4) and (2, 5, 3, 2). Note that the regions wrap around and they can also overlap.

Given the dimension of the grid, the number of switches in action, can you find out the number of bulbs that are *on* at the end?

Input

The first line of input is an integer T ($T \leq 25$) that indicates the total number of test cases.

Each case starts with two integers N ($1 \leq N \leq 30,000$) and M ($1 \leq M \leq 30,000$). N indicates the size of the grid and M specifies the total number of switches. Each of the following M lines gives the information of a switch.

The information for a switch is represented by four integer values $row, column, width, height$. Here ($1 \leq row, column, width, height \leq N$).

Output

For each case, print the case number followed by the total number of bulbs that are *on* after all the switches are pressed.

Note that the order in which the switches are pressed is extraneous for the final outcome and therefore its intentionally not stated.

Sample Input

```
3
6 0
6 3
4 3 2 2
5 5 4 4
2 5 3 2
1000 1
1 100 5 5
```

Sample Output

```
Case 1: 21
Case 2: 13
Case 3: 500525
```