

Dyson Box

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 256 megabytes

A Dyson Sphere is a hypothetical megastructure that completely encompasses a star and captures a large percentage of its power output. The concept is a thought experiment that attempts to explain how a spacefaring civilization would meet its energy requirements once those requirements exceed what can be generated from the home planet's resources alone. Only a tiny fraction of a star's energy emissions reach the surface of any orbiting planet. Building structures encircling a star would enable a civilization to harvest far more energy.

One day, Moca has another idea for a thought experiment. Assume there is a special box called Dyson Box. The gravitational field in this box is unstable. The direction of the gravity inside the box can not be determined until it is opened.

The inside of the box can be formed as a 2-dimensional grid, while the bottom left corner's coordinate is $(0, 0)$ and the upper right corner's coordinate is $(2 \cdot 10^5, 2 \cdot 10^5)$. There will be n events. In the i -th event, a new cube will appear, whose upper right corner's coordinate is (x_i, y_i) and bottom left corner's coordinate is $(x_i - 1, y_i - 1)$.

There are two directions of gravity in the box, **vertical and horizontal**. Suppose Moca opens the box after the i -th event. In that case, she has $\frac{1}{2}$ probability of seeing the direction of the gravity inside the box is vertical, and the other $\frac{1}{2}$ probability is horizontal. And then, she will measure **the total length of the outline of all the cubes**. If the direction of gravity is horizontal, all the cubes inside will move horizontally to the left under its influence. Similarly, vertical gravity will cause all the cubes to move downward.

Moca hates probability, so that she is asking for your help. If you have known the coordinates of all the cubes in chronological order, can you calculate the total length of these two cases after each event?

Input

The first line contains one integer n ($1 \leq n \leq 2 \cdot 10^5$) – the number of cubes.

Each of the following n lines describes a cube with two integers x_i, y_i ($1 \leq x_i, y_i \leq 2 \cdot 10^5$).

It is guaranteed that no two cubes have the same coordinates.

Output

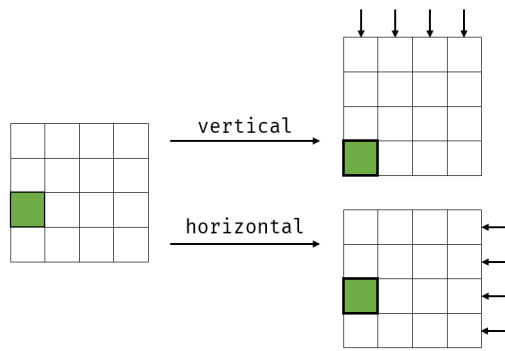
For each of the n cubes, print one line containing two integers – two answers when the the direction of gravity is vertical and horizontal.

Example

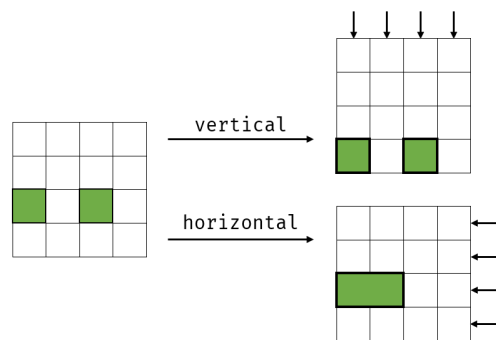
standard input	standard output
4	4 4
1 2	8 6
3 2	8 8
2 1	10 8
4 1	

Note

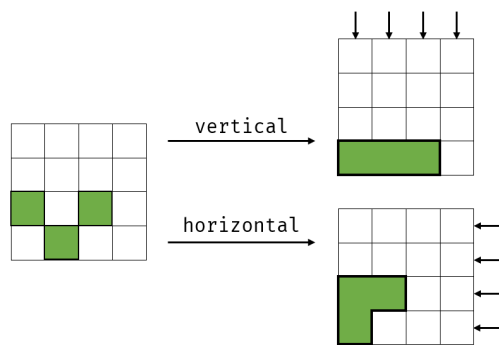
In the only example, the inside of the box is as below, and the bold lines mark the outline of all the cubes.
After the 1-st event:



After the 2-nd event:



After the 3-rd event:



After the 4-th event:

