IOI Training Camp 2013 – Test 3, 3 May, 2013

Triangle equality

Consider three distinct points A,B,C on a plane. The sum of straight line distances from A to B and B to C is always greater than or equal to the straight line distance from A to C. Equality holds only when ABC is a degenerate triangle. This is the famous triangle inequality

In this case, distance between points is measured by the Euclidean metric—that is, the distance between points (x_1, y_1) and (x_2, y_2) is given by $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. However, this is not the only metric possible. Another common metric used is the Manhattan metric where the distance between the pair of points is given by $|x_1 - x_2| + |y_1 - y_2|$.

You are given N distinct points on a plane where distances are measured using the Manhattan metric. Find the number of ordered triplets of distinct points (A, B, C) such that the sum of distances from A to B and B to C is equal to the distance from A to C.

Input format

- The first line of input contains an integer N, the number of points.
- Following this are N lines, each giving the x and y coordinates of a point separated by a space. All coordinates are integers.

Output format

A single line: the number of ordered triplets of distinct points with the given property

Test data

- Subtask 1 (15 marks) : $N \leq 100$, $|x_i|, |y_i| \leq 1000$
- Subtask 2 (25 marks) : $N \leq 2000$, $|x_i|, |y_i| \leq 1000$
- Subtask 3 (25 marks) : $N \leq 10^5$, $|x_i|, |y_i| \leq 10^5$
- Subtask 4 (35 marks) : $N \leq 10^5$, $|x_i|, |y_i| \leq 10^9$

Sample input 1

```
3
0 0
1 1
2 2
```

Sample output 1

```
2
```

Sample input 2

```
3
0 0
1 2
2 1
```

Sample output 2

```
0
```

Limits

- *Memory limit* : 128 MB
- *Time limit* : 4s