The naive solution for solving this problem involves checking for each possible quarter of points if they form a rectangle then counting them. For instance, given the points A B C D, if the x coordinate of A is equal to that of B, the x coordinate of C is equal to D's, D's y coordinate is equal to that of A and C's y coordinate is equal to B's. This can be checked using 4 for's for a complexity of number of points to the power of 4.

However, since that solution is rather expensive time-wise, I have chosen a somewhat different approach that I illustrated below. One thing to note before that, the points are read from a file where one point is represented by its x coordinate and its y coordinate, separated by a space.

Forming Lines

Firstly, all points (represented as a tuple of two integer numbers) are received as a list by the "GetLinesParallelToX" method. Then, all pairs of points that have the same Y coordinate are paired together (by calling the function "CreateLine") are added to another list, effectively creating "lines". As these "lines" are formed by points with equal Y coordinates, they are parallel to the X axis.
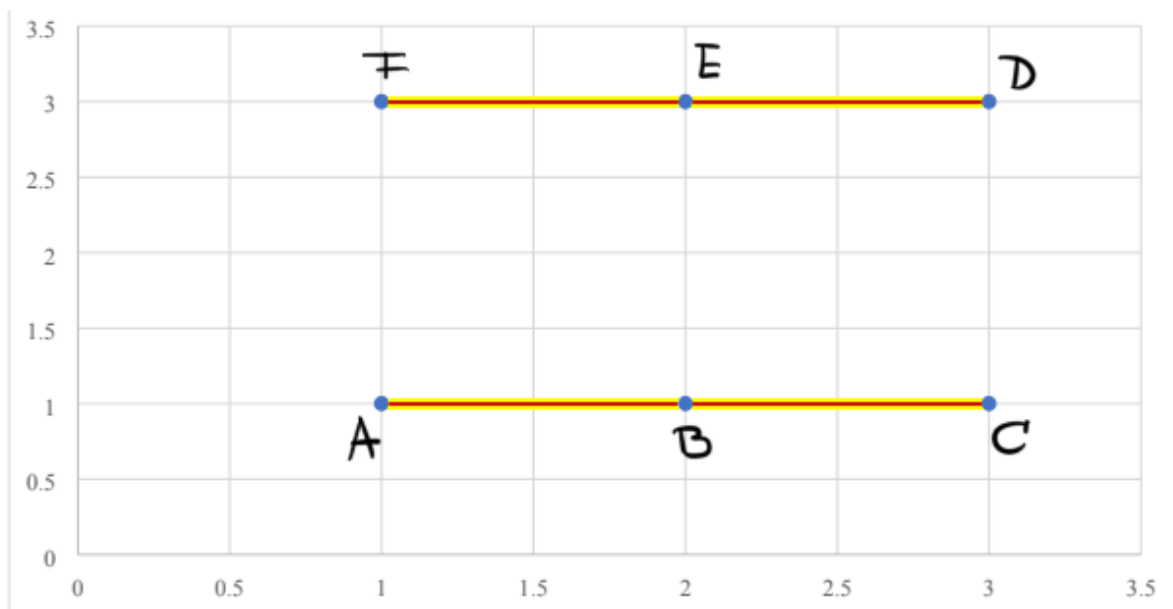

Figure 1: The lines AB, BC, ED, FE (red) and AC, FD (yellow)

Let it be noted that, when forming a line, the point with the lowest value for X is placed first in the line tuple, the reason for which is explained in the next section.

Completing the Rectangles

After all the lines (tuples of two points) have been formed, they are received as a parameter by the function "GetRectCount". This method will check for each two lines if they can form a rectangle by examining the equality of the X coordinates of the corresponding end points of the lines, that is, the X's of the first item of both tuples and the X values of the second items. This is safe, since the the point tuples that form the lines are ordered, i.e. the case where the first item of a line tuple has the same X as the second element of the other line tuple and the second item has the same X as the first of the other line tuple.

Take for instance the line segments AB and FE from *Figure 1*. In order to check whether or not they form a rectangle, one must simply look at the y coordinates of the endpoints, i.e. A, B, F and E. Here, A and F have matching X's, as do E and B. The same applies for BC and ED and for AC and FD.
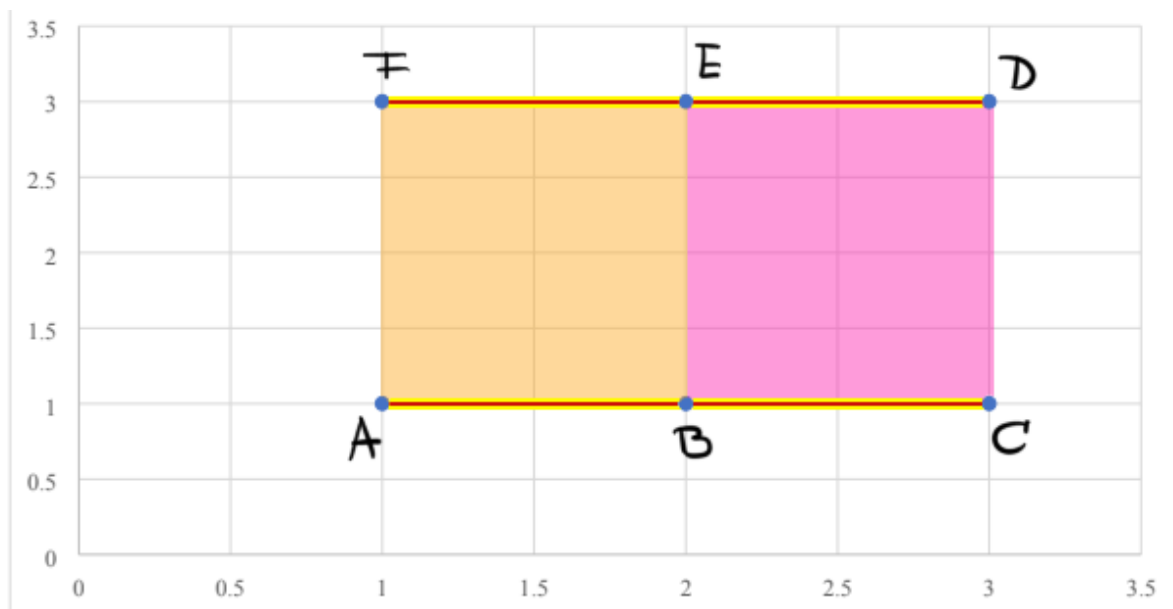

Figure 2: The rectangles ABFE, BCED and ACFD