CS 210 **October 6, 2016**
Assignment 06 **Due: October 20, 2016**
Vectors

Reminder: This is a programming project, and work on this assignment should be done individually. Assistance from other students is limited to questions about specific issues as noted in the syllabus.

For this assignment you will read a file which no more than 20 lines where each line has and *x* and *y* coordinate separated by a comma. Each coordinate should be taken as a point in the Cartesian plane. Your program will provide a menu to the user allowing her to select one of five options: 1) points closest together 2) points furthest apart 3) triangle with the smallest area, 4) triangle with the largest area 5) exit.

The user will select an option and your program should produce the desired result with appropriate messages and reprint the menu to the screen. Continue this process until the user selects option 5 for exit.

You will need the following equations:

$\text{Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

where x_1, y_1 are the coordinates of one point and x_2, y_2 is the coordinates of the second point.

To compute the area of a triangle use the formula:

$Area = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = (a + b + c) / 2$ and a, b, and c are the lengths of the three sides of the triangle.

To calculate the length of the sides you can use the distance formula:

Your program must be organized in modular fashion using methods. At a minimum you will need the following functions.

1. An input function which prints a menu and returns the number of the option chosen by the user. This function has no arguments but returns and int indicating option chosen.
2. A function to find the distance between two points. This function will have four doubles as arguments to specify the two points. It will return a double indicating the distance.
3. A function to find the area of a triangle from the length of the three sides. It will have three doubles as arguments indicating the side lengths and it will return a double indicating the area.
4. A function to find a triangle. This function will receive as arguments the double 2D array of data, an int indicating the number of points in the array, an int which indicates whether the smallest or largest triangle should be found, and three output int pointers which will indicate the vertex points of the triangle found. It will return a double with the area.
5. A function to find a line length. This function will receive as arguments the double 2D array of points, an int indicating the nmber of points in the array, an int which indicates whether

the shortest or longest line should be found, and two output int pointers which will indicate the end points of the line found. It will return a double indicating the line length.

Turn in a zipped project file. Name your zipped file Asn06XXX.zip where XXX are your three initials. Upload your zipped project file to `\\cecsfp01\users\everyone\CS210.`