CS 2213 Advanced Programming Recitation – Exercise

Due date: check BB

!!!! NO LATE RECITATION WILL BE ACCEPTED !!!

Background: General equation for a line in a plane is *Ax + By + C = 0*, where *A, B, C* are constants that will be given by the user.

Suppose we have two lines *A1x + B1y + C1 = 0* and *A2x + B2y + C2 = 0.*

The intersection point (x0, y0) of these two lines and the angle between them can be found by using the following formulas:

$$x_0 = \frac{\begin{vmatrix} B1 & C1 \\ B2 & C2 \end{vmatrix}}{\begin{vmatrix} A1 & B1 \\ A2 & B2 \end{vmatrix}} \text{ and } y_0 = \frac{\begin{vmatrix} C1 & A1 \\ C2 & A2 \end{vmatrix}}{\begin{vmatrix} A1 & B1 \\ A2 & B2 \end{vmatrix}} \text{ and}$$

$$\cos(angle) = \frac{A1*A2 + B1*B2}{\sqrt{A1^2 + B1^2}\sqrt{A2^2 + B2^2}}$$

Note that $\begin{vmatrix} A1 & B1 \\ A2 & B2 \end{vmatrix}$ means Determinant and it is computed as A1*B2 - A2*B1

If $\begin{vmatrix} A1 & B1 \\ A2 & B2 \end{vmatrix}$ is 0, the lines are parallel, i.e., there is no intersection point.

HW Question:

Write a program that will get the coefficients for two lines and compute/print the intersection point (x0, y0) and the angle between them in terms of degrees if the lines are not parallel.

Design and implement this program in a similar way the textbook did quadeq.c as in Figure 2-1 (pg67-68 in the textbook). You can also get quadeq.c by following the link " programs from the textbook " in the class web page under Ch2 programs).

Specifically, you are asked to implement a function to read the coefficients of a line using call-by-reference. You can call it twice to asks user to enter *A1, B1, C1* for the first line and *A2, B2, C2* for the second line. Then you will write another function to compute the intersection point (x0 and y0 values) and the angle in terms of degrees. Note that we want to see the angle in terms of degree but trigonometric functions in C uses radian so make sure you make necessary conversions!

Your function should use **call-by-value** to pass A1, B1, C1, A2, B2, C2 and use **call-by-reference** to get x0, y0, and angle back. If lines are parallel this function can give an error and quit.

What to return:

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1. Follow the problem solving methodology, and solve the problem. Then convert your solution(s) to a C program. You can name your program as rec3.c /* ADD COMMENTS */
2. Compile and run your program with different values. Copy/paste the results in an output file, say out03.txt.
3. Zip the whole directory and name it as Lastname_Rec3.zip
4. Go to BB, and submit your zip file before the deadline.