**ECE 256 Exercise 3**

**Date:** 4/15/22, Friday, week 11

**Due Date:** 4/30/22, Saturday, week 13

**Submission requirements**: Submit your solutions in Word (or PDF) file together with your C# solution folder (that contains C# code) as a folder or as a Zip file to Canvas. Please do not turn in RAR files since I can NOT open those. In the word / PDF file, you should show the original questions together with your way of doing the questions, the outputs, and explanation your code.

Comment your code appropriately (do not over-comment or under-comment).

Solutions not following the submission requirements above may be subject to grade deduction, substantially if the format is poor, the style is ugly, and the student does not comply with any of the requirements above. Solutions submitted earlier can earn time credit, 1 exercise point for every 2 days ahead of due date. Solutions submitted late are subject to points deductions, 1 exercise point every day.

Pair Programming: In this exercise, you are supposed to perform Pair Programming. Students in the same Pair group may submit just one file, clearly specifying how they divide the programming / review and comment / testing of each question. (please write your Pair Group or team # in the attached PairProgramming Excel file.

**Note every student must be in a Pair group to earn credit.**

**Total Points:** 42 points

1. (20%) **Enhance** the class Circle (a derived class of class Point) to have these methods:
2. 3 methods: onCircle (Point ), inCircle (Point p), outCircle (Point p) to determine if a point p lies on circle c, inside circle, or outside the circle.
3. 5 methods: Intersect (Circle c), tangentOut (Circle c), tangentIn (Circle), disjoint (Circle ), and contained (Circle ), to decide if another circle c intersects this circle, is tangent to this circle from outside, is inside this circle but intersects at a point, is outside of this circle without any touch, or is totally inside this circle.
4. Develop test cases to test all the 8 methods.

Picture below shows red circle contained inside green circle.

**GUI:** Chapter 14 and 15 of Deitel cover GUI (Sharp’s book also covers GUI).

1. (15%) GUI

Develop a C# program with GUI (Windows Forms, WPF etc.) that displays two buttons OK and Clear, and one textbox that you can type text such as “ I like programming”.

When you type something in the textbox, and hit OK, a message box should display your text (a message box is a dialog or a GUI to display message). If you type nothing in the textbox and hit OK, there should be a message telling / warning you that you have typed nothing.

When you hit Clear button, the text in the textbox should be cleared.

Test with several cases.

1. (15%) Mortgage with GUI

Convert Q3 of Exercise 1 on mortgage to have GUIs. In other words, principal, rate, terms will be input via a GUI and output is displayed in GUI.

1. (15%) Complex class with GUI

Enhance class complex with GUI. You will have GUI to input two complex numbers, calculate and display their sum, difference, product, product, and polar form. Also add GUI so that you can computer the powers of a complex number such as a 25 for a complex number a.