***CSC 3020***

***Java Programming***

**Lab 07**

**25 points**

**Due (10:10 A.M.)**

Assignment Objectives:

■■ To use abstract classes.

■■ To discover polymorphism and dynamic binding.

■■ To define interfaces and define classes that implement interfaces.

■■ To define a natural order using the Comparableinterface.

All labs must be submitted by the Canvas. **No email or hard copy** is accepted. You must follow the following format:

1. Submit your file to the Canvas. You must submit your file on time; otherwise, you will receive zero.
2. You can upload your file as many times as you like. Only the last attempt counts because the last file you uploaded is the only file your instructor will see.
3. There will be several modules on the Canvas. You need to upload your file using the correct module on the Canvas.
4. Name the lab file: *Lab (labt number)*
5. To upload your file(s):

* In Course Navigation, click the ASSIGNMENTS module.
* Click the title of the assignment.
* Click the **Submit** Assignment button.
* Add **File**. ...
* **Submit** Assignment. ...
* View **Submission**.

*It is your responsibility to make sure that the file is uploaded correctly. If you uploaded a wrong file, you receive zero; files will not be accepted after due date even if you have a prove that the file is created before the due date.*

***Make sure you review the Cheating & Plagiarism policy on Canvas.***

**Solution to this assignment will not be posted on Canvas; however, any question can be discussed in the class upon request of a student.**

Download GeometircObject files from Canvas (Lab 7 link).

* Implement ***interface Comparable*** in class GeometricObject; override method ***compareTo***. Use getPerimeter method to compare GeometricObjects in method compareTo.
* Override method ***equals*** in class GeometricObject to compare two Circle objects or two Rectangle objects. Use getPerimeter method to compare two objects of GeometricObjects.
* In TestGeometricObject class, create two arrays in main method: GeometricObjects[] and ArrayList<GeometricObject>.
  + Initialize the first array with two Circle objects (radius 5 and 6) and two Rectangle objects (w\h 2, 3 and 3, 4).
  + Initialize the second array with two objects of class Rectangle (w\h 10, 20 and 20, 30) and two objects of class Circle (radius 5 and 15).
  + Call method sort on the first array; use a loop to print each object’s perimeter rounded to one digit before and after you sort the array.
  + Create a method using the below method signature:

***static int search(ArrayList<GeometricObject> list2, GeometricObject element)***

Method search searches for element in list2 and returns its index, otherwise returns -1.

Test method search with an object of type Rectangle and an object of type Cricle

* Submit two files: GeometricObject.java and TestGeometricObject.

Here is a sample run

Before sorting GeometricObjects list:

31.4 37.7 10.0 14.0

After sorting GeometricObjects list:

10.0 14.0 31.4 37.7

Rectangle{width=10.0, height=20.0} is found at index 0

Circle{radius=15.0} is found at index 3