**CSE 220 Homework Assignment 2 (Due 6/18/24)**

**1) (40 pts)** This question deals with concepts related to *classes* and *encapsulation*. Your answers to each part should be 2-5 sentences apiece.  
a. Explain the difference between an instance variable and local variable in Java.  
b. Explain the impact of making an instance variable private in Java, and why this is commonly done.  
c. It is common for the keywords **private**, **static**, and **final** to be confused by someone new to Java. Explain the principal differences between i. making a variable private, ii. making a variable static, and iii. making a variable final.  
d. Explain what the term **constructor** means in the context of Java, and explain what it means to have a constructor **overloaded**.

**2) (60 pts)** The following changes deal with JavaFX and very basic GUI visualization of shapes.  
i. Use a mechanism to read in 4 quantitative values representing arbitrary, but presumably related, measurements from either the keyboard or text file (**your choice, but for the former you will probably want to use text fields on a GUI display for keyboard input because JavaFX is very finicky with System.in input).**  
ii. **Use a JavaFX application and the Arc shape class** to construct a pie-chart *with distinct color pieces* that proportionally model the percentages of the four input measures relative to their total sum. Note: you must use the Arc shape class for full credit  
Ex: If the four measures are 50, 25, 15, and 10, then the first piece of the pie should take up ½ the total, the second ¼, the third 15%, and the last 10% (and each should have a different color).  
 **Extra credit (5 pts)**: In addition to reading in and displaying the pie-chart, you may also pursue 5 points of extra credit by i. reading in String values corresponding to labels for the individual data values and ii. displaying these labels and the corresponding percentages in your GUI display.  
Note: an example text file and screenshot of a corresponding pie chart accompany this file on Blackboard.

**Responses to Problem #1 should be in .doc(x) or .pdf format. Upload a zip file containing this file and your .java file for problem 2 to Blackboard. The zip file (not the .java files) should have the filename “LN\_FN\_2.zip” where LN is your last name and FN is your first name.**