

# CPSC 3200: Algorithm Analysis and Advanced Data Structure

## Summer 2013

### Home Assignment 1

Please work on the following programming exercises from your Data Structure and Algorithms in Java, 5<sup>th</sup> edition textbook.

#### **Question #1:**

**C-1.7:** Write a short Java program that takes two arrays ***a*** and ***b*** of length ***n*** storing integer values, and return the dot product of ***a*** and ***b***.

That is, it returns an array ***c*** of length ***n*** such that  $c[i] = a[i] \cdot b[i]$ , for  $i = 0, 1, \dots, n-1$ .

#### **Question #2:**

**R-1.9:** Write a Java class, **Flower**, that has three instance variables of type **String**, **int**, and **float**, which respectively represent the name of the flower, its number of pedals, and price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and getting the value of each type.

Write a Java class **FlowerTesters** to test your Flower class by creating Flower objects and test their methods.

#### **Question #3:**

**R-2.14:** Write a short Java program that counts the number of vowels in a given character string.

#### **Question #4:**

**P-2.4:** Write a Java program that has a Polygon interface, which has abstract methods, `area()`, and `perimeter()`. Implement classes for Triangle, Quadrilateral, and Hexagon, which implement this interface, with the obvious meanings for the `area()` and `perimeter()` methods. Also implement classes IsoscelesTriangle, Rectangle, and Square, which have the appropriate inheritance relationships. Finally, write a simple user interface, which allows users to create polygons of the various types, input their geometric dimensions, and then output their area and perimeter.

#### **Grading system for each question.**

| Description  |
|--|
| Class name   |
| Comments for the "author" – FirstName, LastName                  |
| Comments for the program description                             |
| <b>Code and code comments</b> following the <b>Javadoc</b> style |