CS2006 C++ Lab Exercises
Week 10

1. Write a Circle class that has the following fields:
   - radius: a double variable
   - PI: a final double variable initialized with the value 3.14159

   The class should have the following methods:
   - Default Constructor: A default constructor that sets radius to 0.0.
   - Constructor: Accepts the radius of the circle as an argument
   - setRadius: A mutator method for the radius field.
   - getRadius: An accessor method for the radius field.
   - getArea: Returns the area of the circle which is calculated as area =PI * radius * radius
   - getDiameter: Returns the diameter of the circle, which is calculated as diameter = radius * 2
   - getCircumference: Returns the circumference of the circle, which is calculated as circumference = 2 * PI * radius

   Write a program that demonstrates the Circle class by asking the user for the circle's radius, creating a Circle object, and then reporting the circle's area, diameter and circumference. Separate both specification and implementation files.

2. Write a class named Car that has the following fields:
   - yearModel
   - make
   - speed

   In addition, include constructor and other member variables:
   Constructor: Should accept the car's year model and make as arguments and assign 0 to speed.
   Accessors for yearModel, make and speed
   Accelerate: the accelerate function should add 5 to speed
   Brake: the brake function should subtract 5 from speed
   Demonstrate the class in a program that creates a Car object and displays the speed of the car before/after accelerating/braking.

3. Design a PayRoll class that has data members for an employee's hourly pay rate, number of hours worked, and total pay for the week. Write a program with an array of seven PayRoll objects. The program should ask the user for the number of hours each employee has worked and will then display the amount of grosspay each has earned. Separate implementation from specification where appropriate. Input Validation: Do not accept values greater than 60 for the number of hours worked.

4. Define the class BankAccount to implement the basic properties of a bank account. An object of this class should store the following data: Account holder's name (string), account number (int), account type string (checking/saving), balance (double), and interest rate (double). Add appropriate member functions to

manipulate an object. Use a static member in the class to automatically assign account numbers. Also declare an array of 10 components of type BankAccount to process up to 10 customers and write a program to illustrate how to use your class.

5. Design a class that has an array of floating-point numbers. The constructor should accept an integer argument and dynamically allocate the array to hold that many numbers. The destructor should free the memory held by the array. In addition, there should be member functions to perform the following operations:
   - Store a number in any element of the array
   - Retrieve a number from any element of the array

   Demonstrate the class in a program. Separate implementation from specification where appropriate.