Homework 4

Due February 16, 11:00am
50 points
CS 4499/5531
Scientific Computing
Dr. Leslie Kerby

1. **Create Vehicle class.**
   a) Create a new class called Vehicle.
   b) It should have 5 private data members:
      year, miles, value, manufacturer, and model
      Use appropriate data types (ie int, float, bool, string, double, etc)
   c) Create public getter and setter methods for the 5 private members, called:
      setYear, setMiles, setValue, setManufacturer, setModel,
      getYear, getMiles, getValue, getManufacturer, getModel
      Again use appropriate data types, and appropriate argument types (or none).
   d) Create a 5-parameter constructor. Create a default constructor which instantiates a 2015 Chevrolet Colorado with 60,000 miles worth $20,000. Use constructor initializers to set the private data members in the constructor.
   e) Demonstrate that your constructors and getter and setter methods all work by calling them and printing output to the screen. Include these screenshots in your submission.

   Note: Utilize a header file for the class prototypes and a source file (other than your main source file) for the class implementations.

2. **Create Truck class.**
   a. Create a Truck subclass which publicly inherits from Vehicle.
   b. It should have 2 private data members:
      awd, towing_capacity
      Again use appropriate data types.
   c. Create public getter and setter methods for the 2 private members, called:
      setAwd, setTowing_capacity,
      getAwd, getTowing_capacity
   d. Create a 7-parameter constructor. Create a default constructor which instantiates a default Vehicle with 4x4 and a towing capacity of 5000 lbs.

Use constructor initializers to set the private data members upon instantiation.

e. Demonstrate that your constructors and getter and setter methods all work by calling them and printing output to the screen. Include these screenshots in your submission.

Note: same note on header and source files for declarations and definitions.

3. **Create a vector of Trucks.**

   a. Create a vector of five Trucks. You may choose the 5 trucks you wish to create. Be reasonable in your estimations of value, towing capacity, etc, and give your sources (for new: manufacturers website; and for used: something like cars.com).
   Hint: Create the vector of trucks with this statement:
   vector<Truck> trucks;
   This creates an empty Truck vector; then add one truck at a time with
   trucks.push_back(Truck(2015,60000,20000,"Chevy","Colorado",true,5000));
   Alternatively, you may instantiate the vector of five trucks at declaration:
   vector<Truck> trucks(5);
   This will create five default trucks, and you would then use the setter methods to set private member data:
   trucks.at(0).setYear(2015);   // or trucks[0].setYear(2015);

   b. Using the getter methods, print out all 7 private member variables for each of the five trucks in the Truck vector (show in an understandable way the 5 trucks you picked). Include a screenshot(s) with your submission.

4. **Graduate students only.**

   a. Find the average value of the 5 trucks.
   b. Determine the range of years of the 5 trucks.
   c. Determine the range in miles of the 5 trucks.
   d. Determine the most common manufacturer (if there is one).
   e. Print all this information to the screen in an understandable way.

Attach your source code, screenshots of output, and header files. Include compiled executables if you wish.