Homework 4
Object Oriented Design

Instructions:

- You may discuss concepts with your classmates. This fosters group learning and improves the class' progress as a whole. However, make sure to submit your own independent and individual solutions.
- Code submission:
    1. Upload a zip file containing sub directories for each problem. Set the name of each folder similar to the name of the problem (i.e., problem4_1, problem4_2, etc.).
    2. Each sub directory should contain all source files for this problem, for example c/c++ file and input txt file (if applicable). Each program should have a make file to ease the compilation process.
    3. If the executable needs some arguments, please create a README file to describe how to run your program and give an example.

Problem 4.1: OO Design and Make file [30pts]

In Homework #2 you wrote a linked list program. In this homework, you modify that program to make it objected oriented. You will need to use classes, making sure to encapsulate your data in a class, and providing class member functions. Use constructor and destructor in your design, and destroy your linked list in your destructor.

Do not forget to separate your class declaration (linkedList.h), implementation (linkedList.cpp) and your main (main.cpp) in three different files.

You will need to write a make file for compiling your code. Use symbols to make your "Makefile" reusable with small modifications. You will use the same "Makefile" as a template for all the programs in this homework.

Problem 4.2: Templates [20pts]

Develop and implement an object-oriented design that provides 2 different types of operations (e.g., comparison, summation, logical) on 3 different types of data (e.g., strings, integers, and doubles). Consider how to make your code reusable. Consider using templates. Demonstrate that your program can construct, operate upon and destruct objects utilizing these capabilities. Do not forget to create make file for your program.

Problem 4.3: OO Design [20pts]

We all love our pets, so let's develop an object-oriented C++ program that maintains a record of pets (e.g., dogs, cats, hamsters, etc.) and their owners. You will need to use classes for implementing your design for this assignment, making sure to encapsulate your data in a class, and providing class member functions to initialize, read, write and update the

information in your classes. Make sure you consider carefully what data you store in each class.
To demonstrate that your new class works, instantiate 10 different pets of different types (or read from an input file, similar to problem 4-4), and illustrate that your member functions are working properly.

Problem 4.4: OO Car List [30pts]

Write an object-oriented C++ program that reads in **any number** of used car records stored in a **file**. Each record has the following format: car make, car model, year, color. For instance, the file may contain:

Toyota, Matrix, 2006, silver
Volvo, XC70, 2009, blue

Helpful hints for reading from the file and splitting string:
C – File I/O : http://www.tutorialspoint.com/cprogramming/c_file_io.htm
String splitting: http://www.tutorialspoint.com/c_standard_library/c_function_strtok.htm

Store your records objects in an object-oriented design. How and where you store the data is up to you, and there is no one right way of how to design this application. You are the designer of your classes. Just make sure to encapsulate all data in class.

a.) Provide the ability to print out the records in **either ascending or descending order** based on car model.
b.) Provide the ability to print out the records in **either ascending or descending order** based on the year field.
c.) Provide the ability to identify any repeated records, and print them out when found in the input file.

Generate an example input file and include it in the submission. Do not forget to create make file for your program.