**ECE 15200: Programming for Engineers**

**Purdue University Northwest, ECE Department**

Laboratory 9: Structures and File Handling

**Instructions**:

* Submit only C++ source files (\*.cpp) for all the problems through Brightspace.
* Name each file following the format ***Lastname\_*Lab*X*\_p*Y*.cpp**, replace *Lastname, X,* and *Y* with your last name, lab #, and problem #, respectively.
* Put your name, assignment number, and date on the top of each source file (\*.cpp) as multi-line comment given below:

/\*

Class: ECE15200

Author: [Your Name]

Assignment: Lab [No.]

Date: [MM]/[DD]/[YY]

\*/

Remove the brackets after updating the information in them.

* PLEASE WORK ALONE. If any plagiarism is found, you will get ZERO. Never hesitate to discuss with the instructor/TA if stuck in any assignment problem.

**Problem 1** (Lastname\_Lab9\_p1.cpp). Write a program that prompts a user to input the current month, day and year. Store the data entered in a suitably defined **structure**, and display the date in an appropriate manner [**20 points**].

**Problem 2** (Lastname\_Lab9\_p2.cpp). Declare a single structure data type suitable for a car structure of the type illustrated below:

|  |  |  |
| --- | --- | --- |
| **Car Number** | **Miles Driven** | **Gallons Used** |
| 25 | 1950 | 65 |
| 36 | 3260 | 130 |
| 44 | 1789 | 68 |
| 52 | 2367 | 110 |
| 68 | 2135 | 153 |

Write a program using the data type you declared to interactively accept the above data into an array of structures with five elements. Once the data have been entered, the program should create a report listing each car number and miles per gallon achieved by the car. At the end of the report include the average miles per gallon achieved by the complete fleet of cars [**20 points**].

**Problem 3** (Lastname\_Lab9\_p3.cpp). Write a function named days() that computes the number of days since January 1, 1900 for any data passed as a structure. Use the Date structure as follows:

struct Date{

int month;

int day;

int year;

};

To implement days() function, assume that each year consists of 360 days and each month consists of 30 days. The function should return the number of days for any Date structure passed to it. Write a main()function to test your function [**20 points**].

**Problem 4** (Lastname\_Lab9\_p4.cpp). Create a text file named employee.dat containing the following data. The fields in each record should be separated by tab.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | Anthony | | A | 10050 | 7.99 | 12/28/2017 |
| |  | | --- | | Burrows | | W | 10051 | 9.00 | 6/9/2018 |
| |  | | --- | | Fain | | B | 10052 | 8.99 | 5/18/2019 |
| |  | | --- | | Janney | | P | 10053 | 10.99 | 9/28/2019 |
| |  | | --- | | Smith | | G | 10054 | 8.99 | 12/20/2018 |

Write a C++ program to read the employee.dat file and produce a duplicate copy of the file named employee.bak [**20 points**].

**Problem 5** (Lastname\_Lab9\_p5.cpp). Create a file containing the following: car numbers, miles driven, and gallons of gas used in each car (*do not include the heading and fields are separated by tab in each record*):

|  |  |  |
| --- | --- | --- |
| Car Number | Miles Driven | Gallons Used |
| 25 | 1500 | 65 |
| 36 | 3540 | 138 |
| 44 | 1889 | 65 |
| 52 | 2466 | 115 |
| 68 | 2265 | 87 |

Write a program that reads the data from the file and displays the car number, miles driven, gallons used and the miles per gallon for each car. The output should also contain the total miles drive, total gallons used, and average miles per gallon for all the cars. These totals should be displayed at the end of the output report [**20 points**].