**Lab 3 - Preprocessor, functions, and Structs**

Part 1 -- Setting Up Your #defines and functions

# Part A

* + Set up the following #defines
    - SECONDS\_IN\_A\_MINUTE
    - MINUTES\_IN\_AN\_HOUR
  + Set up a macro called ‘TRACE’ that prints the current line number using the global [\_\_LINE\_\_](http://www.cprogramming.com/reference/preprocessor/__LINE__.html)
  + Create a function that takes number of hours, minutes, and seconds as integers, and returns the total number of seconds. Call your TRACE macro at the beginning of the function.
    - The function signature should look like this:  
       int numSeconds(int hours, int minutes, int seconds);
    - The function should be defined after your main

Part 2 -- Define Your Own Types

# Part A

* + Create a time struct that contains the following attributes:
    - Hours
    - Seconds
    - Minutes
  + Write a function that calculates the difference between two time structures by calculating the total seconds each time structure represents by subtracting the total number of seconds. The function should return a new time structure that represents the elapsed time (in hours, minutes, and seconds) between the two times.
    - Where time1 represents 3:45:15 and time2 represents 9:44:03, the function should create and return a time structure that represents 5 hours, 58 minutes, and 48 seconds.
    - All times are in military time
  + Do not use scanf for input. Just hardcode the following values for testing:
    - 1:30:45 and 16:30:45
    - 00:01:01 and 23:59:59
    - 12:00:00 and 12:00:00

# Part B

* + Create another struct called DateTime that contains both the date and the time (using the time struct from part A). The struct must contain the following:
    - time struct
    - enum type representing months *(the enum should be defined outside of the struct)*
    - day
    - year
  + Create structs with the following datetimes, and print them to the console:
    - January 19 1809 12:01
    - November 11 1922 6:00
    - January 6 2000 8:22
      * *You must print these datetimes using the struct*

Part 3 - Submission

Create a tar archive with the command “tar -czvf lab3.tar.gz .”, and then email your archive to [bu580u@gmail.com](mailto:bu580u@gmail.com) and cc your TA [ssopark1@binghamton.edu](mailto:ssopark1@binghamton.edu) before the submission deadline. Make sure you do not include the executable in your archive (make clean before creating the archive). Late assignments will not be accepted under any circumstances. Plan to turn in your assignments early.

Demo your lab before the demo deadline (after the submission deadline) by downloading your submission from class Gmail and extracting your archive with the command “tar -xvf lab3.tar.gz”. Then compile (with your makefile), and run your code, show your source to your TA, and answer any questions your TA may have.

Grading Guidelines

## Part 1:

* + All required defines, macros, and functions are functioning: 2 points

## Part 2:

* + Part A: 4 points
  + Part B: 3 points

## Style Guidelines - 1 point

* + Follows Style Guidelines

Submission Deadline: 11:59pm 10/10/2016 EDT

Demo Deadline: 11:40am 10/21/2016 EDT