ENEE 140 Lab 3

Lab instructions

This handout includes instructions for the recitation sessions on Wednesday and Friday. **Follow these instructions** to familiarize yourself with the debugger from your IDE, then **submit the homework** as indicated below. To prepare for the next lecture, complete the **reading assignment** and try to solve the **weekly challenge**.

1 Basic lab skills

Make sure that you know the following by now:

1. Log in your GRACE account from PC and Linux
2. Access class public directory on GRACE
3. Access class webpage at `http://ter.ps/enee140`
4. Access the Piazza message board, at `https://piazza.com/umd/fall2025/enee140`
5. Write, build and run programs in CLion

Homework

Due: Friday at 11:59 pm.

Create two programs, called `count_char.c` and `gas_mileage_conversion.c`, by following the instructions below.

Create a .zip archive containing your programs, then log into Elms, click on Gradescope in the course menu, then go to the relevant assignment to submit your program.

1 Character input

The `getchar()` function allows you to read from the input one character at a time. Write a program called `count_char.c` that reads its input character-by-character, until it encounters the end-of-file (EOF) maker, and then prints the number of `'a'` characters it has read.

Hint: you can use the program from Chapter 1.5.2 (page 19) of the textbook as a starting point.

2 Gas mileage

In the United States, the fuel efficiency of a car is customarily expressed in miles-per-gallon (mpg) of gasoline, while in European countries it is usually expressed in liters-per-100km (l/100km). Using the programming techniques demonstrated in class for converting Celsius degrees to Fahrenheit degrees, write a program called `gas_mileage_conversion.c` that prints an mpg – l/100km conversion table. The table should start at 10 mpg and end at 50 mpg, with an increment step of 5 mpg.

Remember that:

> Kilometers = Miles * 1.60934
> Liters = Gallons * 3.78541

Hint: To determine if your program produces the correct results, you can search Google for a particular conversion, for example “25 mpg in l/100km”.

Reading assignment

K&R Chapters 1.7, 1.8, 7.2, 7.4, B4

Weekly challenge

Rewrite the Celsius ↦ Fahrenheit temperature conversion program to use a function: implement a function, called `celsius2fahrenheit`, that implements the conversion and invoke this function from the while loop that prints the table. You can use the following template (also available on the class Web page):

```c
/*
 * temperature_conversion_function.c
 *
 *  Rewrite the temperature conversion program to use a function.
 *  K&R Exercise 1.15
 */

#include <stdio.h>


#define LOWER   -100
#define UPPER   100
#define STEP    10


float celsius2fahrenheit(float celsius);


int
main()
{
        // Add your code here

        return 0;
}
```

The weekly challenge will not be graded. However, if you manage to solve it, you may submit it for extra credit. The deadline for submitting your solution to the weekly challenge is **Monday at 11:59 pm**.

Submit it by going to the relevant assignment in Gradescope.