APS 105 — Computer Fundamentals

Lab #1: Simple Calculations

Winter 2022

You must use `examify.ca` to electronically submit your solution by 11:59 pm on **Saturday, January 22, 2022**.

Objective

In this lab you will be writing three simple C programs: the first will print some basic messages, and the next two will perform some simple calculations. Input and output must be done using `scanf` and `printf`.

In the sample output examples that follow, the text that would be entered by the program user is displayed using a **bold** font. The text **<enter>** stands for the user pressing the `enter` key on the keyboard. On some keyboards, the `enter` key may be labeled `return`. When you execute your programs, the user's text will not be displayed in bold and **<enter>** will not be shown.

In Visual Studio Code, place your solution for each part in a separate directory, so that Visual Studio Code will not attempt to compile multiple files and link them together.

Part 1 — Printing

Write a C program that produces the following output. The output must be *exactly* as shown:

```
C uses escape sequences for a variety of purposes.
Some common ones are:
to print ", use \"
to print \, use \\
to jump to a new line, use \n
```

Part 2 — Car Rental

iRent, a fictional car rental company, is currently having a promotion advertised as "rent 3 days and drive 1 day free". The fine print reads that 1 day within each 4-day block is free. This means that there is no discount for a rental of 1 to 3 days, however, a 4 day rental is charged for only 3 days. For rental periods of more than 4 days the same rule applies to each 4-day block in the rental period. For example, if you rent a car for 11 days you are charged for 9 days. This is because it contains two 4-day blocks plus an extra 3 days; each of these first two 4-day blocks is counted as 3 days while there is no discount for the last 3-day block.

Write a C program that calculates the total amount that a customer should pay for renting a car from iRent. A 13% HST should be applied when calculating the total amount. Your program reads in the daily rate or rental charge per day (in dollars) and the rental period (in days). It then prints the number of free days that the customer receives, followed by the total charge (tax inclusive) **rounded to two decimal places**.

Here is a sample output from an execution of the program:

```
Enter the daily rate: 28.41<enter>
Enter the rental period (in days): 10<enter>

Your total free day(s) in this rental is: 2
Your total charge including taxes is: 256.83
```

Note: You can assume that the user enters valid numbers. You should represent the HST tax rate using a constant variable.

Part 3 — Unit Conversion

Write a C program that asks the user to enter a distance (assumed to be in metres). Convert this distance to yards, feet, inches and a decimal number, **rounded to two decimal places**, that indicates any remaining fraction of an inch. Use the conversion factor 1 inch = 2.54 cm. For example, if the user enters a value of `3.376`, the output will be:

```
3 yards, 2 feet, 0 inches, 0.91 inches remainder
```

The prompt to the user should take the form:

```
Please provide a distance in metres:
```

written by itself on a single line.

Note: if the input leads to something like the following:

```
1 yards, 1 feet, 1 inches, 0.00 inches remainder
```

This is fine. You do *not* need to change the output to read `1 yard, 1 foot, 1 inch`. Likewise, if yards, feet or inches have a value of 0, no need to remove their prints from the output.

Marking

This lab will be marked out of 10, 2 marks for Part 1, 4 marks for Part 2, and 4 marks for Part 3. The automarker may use multiple test cases in each part, and if this is the case, the marks for this part will be evenly split between the test cases. The test cases used for marking may or may not be the same as the test cases that are made available to you. The deadline is strictly enforced (**11:59 pm on Saturday, January 22, 2022**), so avoid last minute submissions.