ECE 175: Computer Programming for Engineering Applications

Homework Assignment 2

Due Date: January 30, 2018, 11:59 PM

Conventions: Name your C programs as *hwx_py.c* where x corresponds to the homework number and y corresponds to the problem number. As an example the C program for hw1 problem 1 should be named as *hw1_p1.c*.

Write comments to your programs. At each program you turn in at least the following info should be included

- Author:

- Date created:

- Brief (two-line) description of the program:

Submission Instructions: For the programming assignments, use the dropbox on D2L to submit

- Pseudo code for each of the problems
- The corresponding .c files

Problem 1: A wireless company offers customers the following cellular plan:

600 minutes	$39.99
Additional minutes	$0.40 per min
Data up to 2GB	$10
Data exceeding 2GB	$10 per GB, rounded to the nearest GB (ceiling)
Taxes and surcharges	5.25%

Write a program that prompts the user to enter the number of minutes and GB consumed and calculates (a) the pre-tax monthly bill, (c) the tax amount, and (d) the total bill.

Sample program execution (user's entries in red):

```
Enter the number of minutes: 700

Enter the data in GB: 2.5

Your monthly charges are as follows.

Monthly Plan : $39.99

Additional per minute charges: $40.00

Data charges: $10.00

Additional data charges: $10.00

Pretax total: $99.99
```

```
Tax paid : $5.25

Total: $105.24
```

Test cases: (500, 1), (700, 2.5), (0, 4.2), (0,0).

Problem 2: Write a program that computes the roots of a quadratic equation $ax^2 + bx + c = 0$, which are given by the following formulas:

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}, \qquad x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}.$$

These formulas cannot be used if the value of $a = 0$, or if the value $b^2 - 4ac < 0$ (complex roots). For the case $a = 0$, the solution of the equation is simply given by:

$$x = -\frac{c}{b}$$

assuming that $b \neq 0$.

Your program should ask the user to input the coefficients a, b, c of the quadratic equation and print the corresponding solution or appropriate messages. You can use the math library function sqrt(x) to compute the square root of a number x.

Sample program execution (user's entries in red):

```
Enter the coefficients of the quadratic equation>1 -2 -2

The roots of the quadratic are: x1=2.73, x2=-0.73
```

Test cases: (1, -2, -2), (1, -2, 1), (1, 1, 1), (0, -2, 2), (0, 0, 0).

Submit your .c files named hw2_p1.c hw2_p2.c via D2L dropbox and a pdf with your pseudo-code