ECE 175: Computer Programming for Engineering Applications

Homework Assignment 3

Due Date: September 16, 2010 11:59 PM

Write comments to your programs. Programs with no comments will receive PARTIAL credit. At each program you turn in at least the following info should be included

- Author: YOU MUST PUT YOUR NAME ON THE PROGRAM OTHERWISE IT WILL NOT BE GRADED!
- Date created:
- Brief (two-line) description of the program

Problem 1: Write an interactive C program that converts USD to Euro. Ask the user to input the amount of USD that he wants to convert to Euro. Display the conversion result and then ask the user if another amount must be converted or the program must terminate.

Sample program execution:

Please enter the amount of USD you want to convert to Euros>
x.xx USD equals x.xx Euros. Do you want to convert another amount (y/n)?>

Problem 2: Write an interactive program that computes the area of a square or a triangle. The user is first prompted to enter the first character of the figure type (S or T). Then the user is prompted to enter the side length in the case of a square or the base and height in the case of a triangle. The program outputs the area of the figure on the screen.

Sample program execution:

Please enter the first letter of the shape type>T
Enter the height and the base of the triangle>5 8
The area of the triangle is 20. Do you want to continue (y/n)?>

Problem 3: An m pound vehicle traveling on a road at a velocity of v_0 ft/sec requires a retarding force of $F = ma$ to stop, where $a = (v_i^2 - v_0^2)/(2d)$, $(v_i = 0)$. Write a program that calculates the *magnitude* of the retarding force needed to stop the car at distances d=10, 20, 30, 40, 50, 60, 70, 80, 90, 100 ft. The program asks the user to input the weight of the car m and the initial velocity v_0. It then outputs the values of d and F in a table format. You can use the math library function pow(x,y) to compute x^y. To link the math library compile as follows: gcc -lm problem3.c.

Sample program execution:

Enter the weight of the car in pounds>20
Enter the initial velocity>100

d	F
10	10000
20	5000
30	3333
40	2500
50	2000
60	1667
70	1429
80	1250
90	1111
100	1000

Problem 4: 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). Print the two real roots if they exist; otherwise print appropriate messages. Your program should ask the user to input the coefficients a, b, c of the quadratic. You can use the math library function sqrt(x) to compute the square root of a number x. To link the math library compile as follows: gcc -lm problem4.c.

Sample program execution:

Enter the coefficients of the quadratic equation>1 -2 -2
The roots of the quadratic are: x1=2.73, x2=-0.73
Do you want to solve another quadratic equation (y/n)?>

Submit your .c files named problem1.c problem2.c problem3.c problem4.c via D2L dropbox