PROGRAMMING ASSIGNMENT 2

Subject : Sequential Structures, Selective Structures, Repetitive Structures
Due Date : 5.11.2014

Instructions. In this experiment, you will improve your skills on conditional statements and loops in C programming. The pieces of code which a program will execute can be altered, depending on different conditions thanks to conditional statements. Also the loops can be used for the pieces of code which needs to be performed certain number of times or until a certain condition is met.There are two parts in this assignment. The first part involves a designing of a application which prints different shapes depending on the user input and the second part involves a designing of a application which calculates sine and cosine value of the user input in terms of degree.

Part I: Printing shapes by using asterisks

In this part, you will develop an application which supports the following operations;

1. Printing a square by using asterisks, depending on row number

2. Printing a rectangle by using asterisks, depending on row and column number

3. Printing a triangle by using asterisks, depending on row number

4. Printing a x-axis reflected triangle by using asterisks, depending on row number

Also, application must wait input from user until user enters 'E' character.

The example below shows the outputs and input commands which define a square with 3 rows, a rectangle with 5 rows and 11 columns, a triangle with 4 rows and a x-axis reflected triangle with 6 rows respectively.

```
S 3
***
***
***
R 5 11
***********
***********
***********
***********
***********
T U 4
   *
  **
 ***
****
T D 6
******
 *****
  ****
   ***
    **
     *
E
```

Part II: Approximating sine and cosine functions by using Taylor series

In this part, you will develop an application which supports the following operations;

1. Calculating the sine of a degree input from user by using Taylor series

2. Calculating the cosine of a degree input from user by using Taylor series

$\sin x = \sum\limits_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots$ for all x

$\cos x = \sum\limits_{n=0}^{\infty} \frac{(-1)^n}{(2n)!} x^{2n} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \cdots$ for all x

You can use the formulas above to calculate sine and cosine . The user must enter a input in terms of degree and n number which defines the first n elements respectively. Also before calculation, the degree input must be converted into radian value. **While calculating the factorial and exponent of a number, you must write your own code. You can't use functions in math library for these calculations.** Also, application must wait input from user until user enters 'E' character.

```
30 2
0.499674
0.862922
30 5
0.500000
0.866026
30 20
0.500000
0.866026
45 2
0.704652
0.691575
45 10
0.707106
0.707107
45 30
0.707106
0.707107
E
```

The example above shows inputs and the outputs of the inputs the program executes. Each input command must consist of two parameters, which are the input in terms of degree and the first n elements for calculation. For each input command, program must print sine value and cosine value under the sine value.

Notes

- Don't miss the deadline.

- Save all your work until the assignment is graded.

- The assignment must be original, individual work. Duplicate or very similar assignments are both going to be considered as cheating.

- You can ask your questions via Piazza (`https://piazza.com/hacettepe.edu.tr/fall2014/bbm101`) and you are supposed to be aware of everything discussed in Piazza.

- Save all your work until the assignment is graded.

This file hierarchy must be zipped before submitted (Not .rar , only .zip files are supported by the system)

$\rightarrow$ <student id>
$\rightarrow$ hw2_part_a.c
$\rightarrow$ hw2_part_b.c

Late Policy: You may use up to three extension days for the assignment. But each extension day will bring about additional 10% degradation for evaluation of the assignment.