

ECE 71 – Engineering Computations in C

Class Assignment – February 10, 2009

Professor Kriehn

Due By: Midnight on Wednesday, September 16, 2009

HOMEWORK #5 – Area and Circumference

Prompt the user for the radius of a circle. Compute and display the circle's area and circumference.

Specifications:

The file name should be called **hw5.c**. PI should be defined as a constant having a value of 3.14159. The radius, area, and circumference should be defined as double precision floating point values. Prompt for the radius to be entered in centimeters (cm), and calculate the area and circumference. Then print the results to the screen (with units!). Make sure that 4 digits after the decimal are always displayed for your results.

For instance, if you execute the program, and input a value of 5 cm, the following information should be displayed:

```
~> hw5.o
Enter radius (in cm): 5
The area is: 78.5397 cm^2.
The circumference is: 31.4159 cm.
~>
```

For an input of 5, your program should display this **exactly**. If your program does not follow these specifications exactly, the Grader Program will not accept your submission.

Procedure:

Please perform the following steps before you begin to code your program.

1. Analyze the problem to determine how it should be solved geometrically/algebraically.
2. Determine your Data Requirements. This includes any constants, inputs and outputs (and their data types), as well as any relevant formulas you will need.
3. Design an initial algorithm that you will use as a basis for coding your solution.

Ex: Step 1: Prompt the user for the circle radius.

Step 2: Get the circle radius.

Step 3: Calculate the area.

...

4. Refine any steps to your algorithm that do not have an obvious solution.
5. Use your algorithm as a basis for developing your source code.
6. Compile, debug, and test your code.
7. Verify that your code works correctly for several inputs and that you have met all design specifications.

Submit:

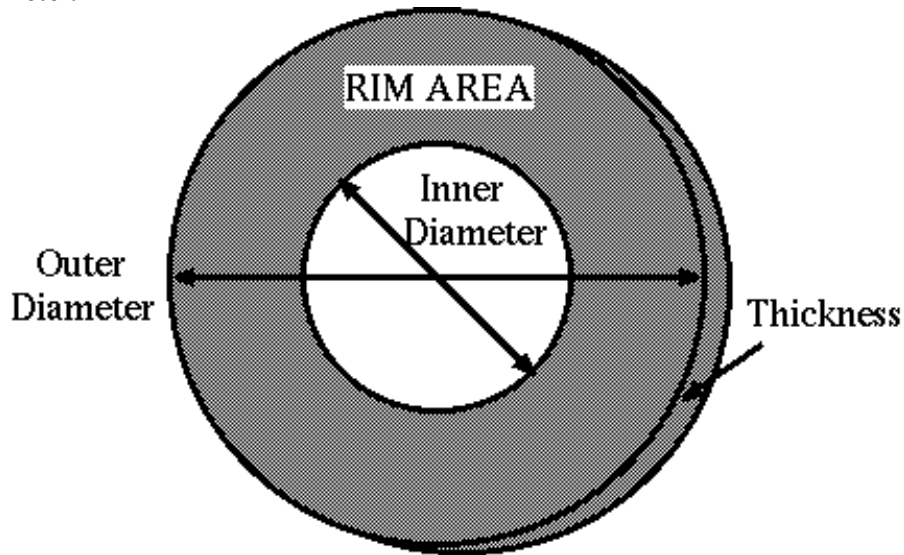
Once you have verified the operation of your program, submit your source code to the Grader Program.

HOMEWORK #6 – Engineering Washer Design Problem

You work at a hardware company that manufactures flat washers. To estimate shipping costs, your company needs a program that computes the weight of a specified quantity of washers.

Analysis:

A flat washer resembles a small donut. To compute the weight of a single flat washer, you need to know its rim area, its thickness, and the density of the material used in construction. The last two quantities should be problem inputs. The rim area must be computed from the washer's outer diameter and its inner diameter.



Specifications:

The file name should be called **hw6.c**. PI should be defined as a constant having a value of 3.14159. Define all variables as double precision floating point values, except for the quantity, which should be an integer value. Prompt for the inner and outer diameter and thickness of the washer to be entered in centimeters (cm). Then prompt for the material density in grams per cubic centimeter (g/cm^3) and the number of washers in the batch. Finally, print out the expected weight in kilograms (kg). Make sure that 3 digits after the decimal are always displayed for your results. Use the same procedure outlined in HOMEWORK #5 to develop your algorithm. Then submit your code to the Grader Program.

If you execute the program with the following inputs, the following information should be displayed:

```
~> hw6.o
Welcome to the Washer Weight Batch Program.
Please enter the following washer information.

Inner diameter in cm: 1.2
Outer diameter in cm: 2.4
Thickness in cm: 0.1
Material density in  $\text{g/cm}^3$ : 7.87
Quantity in batch: 1000

The expected weight of the washer batch is 2.670 kg.
~>
```