

## Homework 2

Due January 28, 11:00am

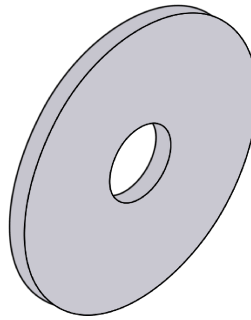
50 points

CS 4499/5531

Scientific Computing

Dr. Leslie Kerby

1. Write a program that calculates the volume of a washer (as pictured below). The program will ask the user for the two radii,  $r_1$  and  $r_2$ , and the height of the washer, then will send these parameters to a function to compute the volume, and lastly output the volume to the screen. Don't forget units and make sure to allow the user to input decimal measurements. Submit a screenshot of the results and your code.



2. Write a program that creates a linear congruential pseudorandom number generator (LCG). Remember, LCGs have the form

$$r_{n+1} = (gr_n + c)(\text{mod } p)$$

Use a modulus of  $2^{24}$  so as not to overflow a *long int* (which has a limit generally of  $2^{31} - 1$  or approximately  $2e9$ ), and a multiplier of 61 with an adder of 1.

Write the LCG within a function, *randlcg()*, which when called will return the next random number in the sequence, keeping track of where it is. Note that in order to keep track of where it is, the *randlcg()* function only needs to remember the last random number it returned. Use a seed of 101,101. Normalize your LCG so that it returns random numbers in between 0 and 1.

Print the first 30 random numbers to the screen and submit a screenshot of the results and your code.