CS 151L Spring 2017 Homework #1

- .m files due by midnight Thursday, February 9, 2017 by email to ahatch2@unm.edu
- Each problem is worth 20 points. Points are given for accuracy, comments and style.
- The code must be named as directed. (2 pts)
- There must be comment lines at the top of each .m file containing your name (1 pt), the date (1 pt), and a description of the assignment (3 pts).
- There must be additional comments explaining sections of the code if the code exceeds 10 lines.
- Unsuppressed output will lose 1 point per incident. Loss will be limited to 10 points per homework set.

1. The golden ratio $\varphi = \frac{1+\sqrt{5}}{2}$. Write a program called **phi.m** which uses MATLAB as a glorified calculator and find this value and output with 6 decimal places.

2. Create a program called **backwards.m** that loops backwards from 50 to 0 by steps of 5. Output the loop index value each pass through the loop. The format style is not important.

3. Write a program called **round_ball.m** where you vary radii from 0.5 cm to 10 cm in steps of 0.5 cm. The correct output will be formatted with headings and units that gives each radius, the diameter, the circumference, the area, and the volume of the related circle or sphere. Use 4 decimal places. Alignment of the decimals will be part of the grade.

4. Write a program using loops called **my_series.m** in which you investigate the given series. Then in a comment at the end of the program address the following questions: Does it converge in on a particular value? How many loops does it take to decide? Do more terms make the decision possible faster?

$$p = 1 - \frac{x^2}{3!} + \frac{x^4}{5!} - \frac{x^6}{7!} + \cdots$$

(from https://plus.maths.org/content/infinite-series-surprises)

5. In a program called **perfect_or_not.m** investigate the integers 2 through 30 looking for perfect numbers, deficient numbers and abundant numbers. Output each number with the word **perfect, deficient** or **abundant** following to describe the relationship of the number with its factors.
   - A perfect number is the sum of all of its factors including 1 but not including itself.
   - A deficient number's factors sum to less than the number.
   - An abundant number has factors that sum to greater than the number.

   (https://nrich.maths.org/2555)