MATH 2720 Introduction to Programming with MATLAB
Homework 3 (Due 9/30 Thur., 9:29AM)

Create script files,

`hw3_p1_yourlastname.m`,$\cdots$ `hw3_p6_yourlastname.m`,

containing commands to carry out the following calculations. Please email your files to me at `minhyung_cho@uml.edu`

1. Let
$$\mathrm{A} = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 4 \end{bmatrix}$$
   (a) Find the determinant of A
   (b) Find A^{-1}
   (c) Solve the system
$$x + 2y + 3z = 2$$
$$2x + 3y + 4z = 2$$
$$3x + 4y + 4z = 1$$

2. Use MATLAB to graph
$$y = \frac{\sin(2\pi x)}{1+x^2}, y = \frac{1}{1+x^2}, y = -\frac{1}{1+x^2}$$
   on the same set of axes for $-1 \leq x \leq 1$.

   Please use the following formatting instructions.

   - Draw the graph of $y = \frac{\sin(2\pi x)}{1+x^2}$ using a solid blue line, draw the graph of $y = \frac{1}{1+x^2}$ using a dashed red line, and draw the graph of $y = -\frac{1}{1+x^2}$ using a dashed green line
   - Create a legend to indicate which curves is which. The only variables in the problems are x and y. Don't use other letters in your legend.
   - Be sure to label your axes. The only variables in the problem are x and y. Don't use other letters in your axis labels.
   - Use enough points so your graphs look like smooth curves.

3. A *cycloid* is specified by the parametric equations $x = r(t - \sin t)$, $y = r(1 - \cos t)$. Draw a cycloid with $r = 1.5$ and $0 \leq t \leq 8\pi$. Use the `axis` command to make the x axis run from 0 to 40 and the y axis run from 0 to 10.

4. Generate a figure with a 1×2 array of windows. In one window, draw a loglog plot of the function

$$C(\omega) = \frac{1}{\sqrt{1 + \omega^2}}$$

for $10^{-2} \leq \omega \leq 10^3$, and in the other window, draw a plot of $C(\omega)$ with the horizontal axis scaled logarithmically and the vertical axis scaled linearly. Be sure to label the axes.

5. Draw a polar plot of $r = 1 + \sin\theta$ for $0 \leq \theta \leq 2\pi$.

6. The temperature (in K) of one mole of an ideal gas occupying a volume of 1m^3 is given by $\text{T} = p/8.314$, where p is the pressure (in Pa). The volume (in m^3) of one mole of an ideal gas at a temperature of 300 K is given by $V = 2.49 \times 10^3/p$. Use the yyaxis command to graph T and V as function of p for $2500 \leq p \leq 3500$. Label the horizontal axis and both vertical axes. Include the units in your axis labels.