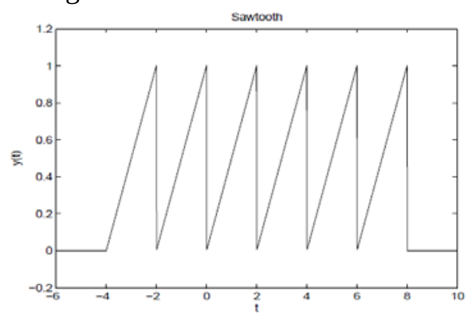
ENGR 160 Algorithms and Applications Sec 02 Spring 2018

Homework Assignment #12 Due 9:00am Apr 13 (F)

Read Sections 11.3, 11.4, and 12.1 of the book

Problem 12.1
Write an anonymous function to implement the following quadratic: $3x^2$-2x+5. Then, use **fplot** to plot the function in the range from -6 to 6.

Problem 12.2
Write a program to plot the following saw-tooth function as shown.



Problem 12.3
Write and run a MATLAB program that uses the function given below and does the following: (1) create an anonymous function; (2) **plot** the function over the x range from 0.1 to 3 with maximum step size 0.01; (3) properly label the x and y axes and put the function in the plot title using TeX symbols; (4) use the **fzero** function to find the roots of the equation over the interval given (you need to do this twice since you need 2 different starting points to find the zeros); (5) plot the 2 resulting points on your plot as red squares; (6) use the **fminbnd** function to find the minimum and plot it on your plot as a downward pointing triangle. Hand in the program that does all of the above and the plot resulting from running the program.

$$f(x) = -5 + e^{0.5x}[\frac{1}{x} + \ln(x)]$$

Problem 12.4
Explore the log scale plotting functions **semilogx**, **semilogy** and **loglog**. Using a log scale plot can reveal large dynamic ranges, which is common in many engineering applications. For example, a frequency-selective amplifier is designed to have its gain amplitude G as a function of frequency f (in Hz), as described in the following equation:

$$G = \frac{1000}{\sqrt{1 + [R(2\pi fC - \frac{1}{2\pi fL})]^2}}$$

, where R L C are resistor, inductor and capacitor values used in the system.

Write a MATLAB script file that will plot the gain amplitude v.s. frequency f over the range of 1 to 1M Hz (1x10^6 Hz), for two different systems:

1) R = 1kΩ, C = 1μF, and L = 0.1H; and 2) R = 10kΩ, C = 0.1μF, and L = 0.01H.

For each of the system, create 4 subplots, the first one using linear x and y axis, the second one using log x axis but linear y axis, the third one using linear x axis but log y axis, and the last one using both log x and y axis. Compare the two systems in the same subplot figures. Use appropriate labels, titles and legends for all your plots. Make sure the system component values are presented in the figure.