EE343 Fall 2013
Problem Set 1

due 9/8

1) Lathi and Ding Chapter 3: 3.1-6, 3.3-2, 3.4-3, 3.7-1

2) The sinusoid $x(t) = \cos(\omega_0 t)$ is the input to the instantaneous nonlinearities shown below. Use matlab to sketch $y_i(t)$ for $1 \leq i \leq 3$. Find the Fourier series coefficients for $y_i(t)$ for $1 \leq i \leq 3$.

   $g_1(x) = x^3 - x^2 + x$
   $g_2(x) = xu(x)$
   $g_3(x) = x^2 \text{sgn}(x)$

3) Sketch the following signals and the magnitude of their Fourier transforms using matlab. What are the similarities and differences between the different signals.

   $a(t) = 100\Pi(100t)$
   $b(t) = 100 \exp(-100|t|)/2$
   $c(t) = 100 \exp(-\pi(100t)^2)$
   $d(t) = 100(1 - 100|t|)\Pi(50t)$
   $e(t) = \frac{200}{1 + (200\pi t)^2}$