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

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

\[
\begin{align*}
g_1(x) &= -x^3 - x^2 + x \\
g_2(x) &= xu(x) \\
g_3(x) &= x^2 \text{sgn}(x)
\end{align*}
\]

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

\[
\begin{align*}
a(t) &= 100 \Pi(100t) \\
b(t) &= 100 \exp(-100|t|)/2 \\
c(t) &= 100 \exp(-\pi(100t)^2) \\
d(t) &= 100(1 - 100|t|)\Pi(50t) \\
e(t) &= \frac{200}{1 + (200\pi t)^2}
\end{align*}
\]