EE354 Homework #2

1. A signal is given by $s(t) = 4sinc(4t) - 2sinc(2t)$. Find the total energy in the signal (hint: use Parseval's Theorem).

2. If a signal $x(t)$ has an autocorrelation of $R_x(\tau) = 5 + 8e^{-3|\tau|}$, determine the Power Spectral Density of $x(t)$ as well as the total power in $x(t)$.

3. The Fourier Transform of a signal is $S(f) = sinc(f)$. Show that the Autocorrelation is triangular in form.

4. A simple digital implementation of a Low Pass Filter can be constructed with a time delay and multiply:

   Determine:
   (a) $H(f)$, the frequency transfer function of the filter.
   (b) The -3 dB bandwidth if T = 1.0 msec.
   (c) Plot $|H(f)|$ and $|H(f)|^2$ and comment on how the results compare to a traditional RC Low Pass Filter.