CPE 3500 Homework-5

1. Use the Fourier transform analysis equation to calculate the Fourier transforms of:
   a) $\delta(t+1)+\delta(t-1)$
   b) $\frac{d}{dt}\{u(-2-t)+u(t-2)\}$

Plot the magnitude of each transform.

2. Given that x(t) has the Fourier transform X(jω), using the Fourier transform properties express the Fourier transforms of the signals listed below in terms of X(jω).

   a) $x_1(t)=x(1-t)+x(-1-t)$
   b) $x_2(t)=x(3t-6)$
   c) $x_3(t)=\frac{d^2}{dt^2}x(t-1)$

3. Consider the Fourier transform pair

$$e^{-|t|} \overset{\mathcal{F}}{\leftrightarrow} \frac{2}{1+\omega^2}.$$

   a) Use the appropriate Fourier transform properties to find the Fourier transform of $te^{-|t|}$.
   b) Use the result from part (a), along with the duality property, to determine the Fourier transform of

$$\frac{4t}{(1+t^2)^2}.$$