ECE 642 - Assignment 3

1. Calculate the correlation function of $x(t) = 2\text{sinc}(t)$.

2. Consider the signal $x(t) = \cos(2\pi t)\cos(20\pi t)$.

a. Calculate and plot the Fourier transform of $y(t) = x(t)\cos(20\pi t)$ using impulse functions.

b. Specify the frequency response of a filter that returns an output signal proportional to $\cos(2\pi t)$.

3. Solve problem 2.8(a) and 2.8(c) in the text.

4. Calculate and plot the absolute value and phase of the Fourier transform of $x(t) = 4\text{sinc}(5t)\sin(200\pi t)$.

5. A signal has the Fourier transform given by $X(f) = 3\delta(f-10) + 2\delta(f+10)$. Classify the signal (periodic vs aperiodic, real vs complex, power vs energy).