**ECE 300**
**Signals and Systems**
Homework 8

**Due Date:** Friday  May 5  at 2:30 PM


**Reading:** K & H, pp. 161-192

**Problems**


1. K & H, Problem 4.16

2. K & H, Problem 4.18 (parts b,c,d)

3. K & H, Problem 4.20

4. K & H, Problem 4.22

5. K & H, Problem 4.24

6. In this problem we'll look at a real world situation when we have to truncate a data set. This actually happens more with digital signal processing, but we can get the basic idea using our continuous time abilities.

    a) Find an expression for the Fourier transform of $f(t) = \cos(4t) + \cos(5t)$ .

    b) Now assume we look at $f(t)$ for a finite time, say $T$ seconds. What we see is actually $y(t) = f(t)rect(t/T)$ . Determine an expression for the Fourier transform of $y(t)$ , and write your answers in terms of sinc functions.

    c) Plot, using **Matlab**, $Y(\omega)$ for $\omega$ between 0 and 10 when $T = 1$, $T = 6$, $T = 10$, $T = 20$, and $T = 40$. Can you clearly tell there are two cosines present when you are looking at $Y(\omega)$ for all values of $T$ ? What happens as $T$ gets larger (you are looking at more and more data)? Think in terms of the width of the sinc function (the distance between the first nulls). Note: The **sinc** function exists in **Matlab**.