**Homework 1 (due on Sep 18)**

1. Classify each of the following signals as an energy signal or as a power signal by calculating E (energy) or P (power). Note: the parameters involved are positive constants. (15pts)
   1. ,
   2. ()
   3. ,
   4. ()
   5. ()
2. Calculate **the Fourier transform and the energy** of the following signals. (20pts)
3. Calculate the convolution of the following signal (10pts)
4. Calculate the Fourier transform of the following periodic signal (20pts)
5. **Determine** the range of permissible cutoff frequencies for the ideal lowpass filter used to reconstruct the following signal

Which is sampled at 2000 samples per second. **Sketch** and (spectrum after the sampling). **Find** the minimum allowable sampling frequency. (15pts)

1. 1) Express the spectrum of

using the spectrum of , where is the Hilbert transform of . (5pts)

2) if sketch . (5pts)

1. Consider , the reference frequency Hz. Calculate the following signals. (10pts)
   1. The Hilbert transform of , i.e., .
   2. The analytic signal .
   3. The convex envelope of , i.e., .
   4. The inphase and quadrature components of , i.e., .

(Please refer to Lecture 2, Slides 36 or Page 88 of reference textbook, we will learn this in the next class. I am sorry for the lagging.）

* 1. Determine and plot the spectrum of the following signals: