Signals and Systems

Homework Assignment #4

Problem 1. Compute the Fourier Transforms of the following continuous time functions.

a. $x_1(t) = e^{-|t|}\cos(2t)$.

b. $x_2(t) = \left(\frac{\sin \pi t}{\pi t}\right)\left(\frac{\sin 2\pi(t-1)}{\pi(t-1)}\right)$.

c. $x_3(t) = \begin{cases} 1-t^2, & 0 < t < 1 \\ 0, & \text{otherwise} \end{cases}$

d. $x_4(t) = (1-|t|)u(t+1)u(1-t)$.

Problem 2. Compute the Fourier Transforms of the following discrete time functions.

a. $x_1[n] = 2^{-|n-1|}$.

b. $x_2[n] = n\left(\frac{1}{3}\right)^n u[n]$.

c. $x_3[n] = (5-|n|)u[n+5]u[5-n]$.

d. $x_4[n] = \left(\frac{\sin(\pi n/5)}{\pi n}\right)\cos\left(\frac{7\pi}{2}n\right)$.

Problem 3. Do problem 4.23 in the text (Oppenheim and Willsky).

Problem 4. Do problem 5.24 in the text (Oppenheim and Willsky). Consider all of the conditions (1-6) for parts a, b, c, and d (i.e., don't do parts e, f, g, h, or i).

Problem 5. Do problem 4.25 in the text (Oppenheim and Willsky).