Exam #1, EE 3302 Signals and Systems
10/15/2014 Professor D. L. MacFarlane

Instructions: Work through the following problems neatly and professionally, and without collaboration of any kind. Please put your name on every page of your work. A perfect score on this exam is 30 points. There is also an extra credit question. You may not consult any notes or text. You may not use a calculator. Please be very clear in the presentation of your work.

Problem 1: Oppenheim, Wilsky and Nawab, from chapter 2 (10 points)

Problem 2: Signals (10 points).

Consider the signal:

$$f(t) = A sin(\frac{4\pi t}{T_0} + \frac{\pi}{4})$$

    a. Is f(t) a power signal or an energy signal? Calculate the relevant property.
    b. Does the Signal have parity?
    c. Separate the signal into its even and odd parts.
    d. Is the signal periodic? If so, with what period?
    e. Calculate the integral

$$\int_{-\infty}^{\infty} \delta(t - \frac{3\pi}{4})f(t)dt$$

Problem 3: Continuous Time Convolution (10 points)

Consider a signal, $x(t) = \sin(t)[u(t) - u(t - 4\pi)]$ and an LTI system characterized by the impulse response $h(t) = e^{-\frac{t}{4\pi}}$

    a) Neatly sketch x(t) and h(t). Label your axes.
    b) Calculate the convolution x(t)*h(t).
    c) What physical system might this h(t) describe? And what situation might the convolution describe?