

ECE 366 HW #3
Fall 2008
Due 09/19/08

- Office Hours: MW 3:30-5:00 p.m.
- The following questions are from Lathi's book, Second Edition.
- Read Chapter 1.4, 1.6 and 1.7.
- You should turn in your solutions to all of the problems.

1. [18] Simplify the following expressions:

a) $\frac{\sin t}{t^2 + 2} \delta(t)$

b) $\frac{\sin\left[\frac{\pi}{2}(t-2)\right]}{t^2 + 4} \delta(1-t)$

c) $\int_{-\infty}^{\infty} x(\tau) \delta(t-\tau) d\tau$

d) $\int_{-\infty}^{\infty} \sin(\pi t) \delta(2t-3) dt$

e) $\int_{-\infty}^t e^{-\tau} \delta(\tau) d\tau$

f) $\int_{-\infty}^{\infty} e^{x-1} \cos\left[\frac{\pi}{2}(x-5)\right] \delta(x-3) dx$

2. [10] Sketch the following signals:

a) $x(t) = 4(t+2)u(t+2) - 4tu(t) - 4u(t-2) - 4(t-4)u(t-4) + 4(t-5)u(t-5)$

b) $x(t) = 5u(t+2) - u(t) + 3u(t-2) - 7u(t-4)$

3. [12] Express the following signals using the unit step and ramp functions. Simplify your answers as much as possible.

- a) Signal in Figure P.1.1-2 d
- b) Signal in Figure P.1.2-1
- c) Signal in Figure P.1.4-2 a

4. [12] 1.7-13

5. [48] For the systems described by the following input-output relationships, determine whether the systems are linear, time-invariant, instantaneous, causal, stable and invertible. Please show your work to receive full credit.

a) $y(t) = \int_{-\infty}^t x(\tau) d\tau$

b) $y(t) = x(at), a > 1$

c) $y(t) = x(t)tu(t)$

d) $y(t) = e^{x(t)}$