EECS 216 – Winter 2008

Homework #3 – Assigned Jan. 22 – Due Tuesday Jan. 29

Grading: Not all problems will be graded, but you should do all of them.
Submission: Submit in black box in room 4230 EECS before 5:00 on Tuesday.
Relevant Lectures: January 22-24 (and earlier ones too!)
Relevant Reading in Textbook: Section 2.3 (convolution); 2.5 (diff. eqns.)

1. (20 points: 4+4+4+4+4) Text #2.11(a),(b),(d),(f),(g) p. 99. Causal, BIBO.

2. (15 points) Text #2.14 p. 100. Series/parallel connections; BIBO stable.

3. (40 points: 10+10+10+10) Compute the following convolution integrals:
   (a) \( y(t) = e^{-3t}u(t) * u(t + 3) \)
   (b) \( y(t) = [u(t + 3) - u(t - 1)] * u(-t + 4) \)
   (c) \( y(t) = (2 \delta(t + 1) + \delta(t - 5)) * u(t - 1) \)
   (d) \( y(t) = [2 \delta(t) + \delta(t - 2)] * \sum_{p=0}^{\infty} \left(\frac{1}{2}\right)^p \delta(t - p) \)

Before you pass out, look at each one–they simplify greatly.

4. (25 points: 5+5+5+10) A system has transfer function \( H(s) = \frac{10}{s + 4} \).
   Compute \( y(t), -\infty < t < \infty \), for the following \( x(t), -\infty < t < \infty \):
   (a) \( 3e^{4it} \)
   (b) \( 3 \cos 4t \)
   (c) \( 3 \sin(4t + \frac{\pi}{3}) \).
   (d) \( (\cos 2t)^2 \) HINT: Use a trig identity.