Homework Assignment #4

Due date – Oct. 11, 2012 (Thu), in class.

Note: If you are enrolled to the honors section (314-200), write “HONORS” next to your name on the cover page

Problem 1. Discrete-time systems described by linear difference equations

Follow similar steps as in 2.32 to find the output $y[n]$ of the following system.

$$y[n] - \frac{3}{2}y[n-1] + \frac{1}{2}y[n-2] = x[n]$$

(a) Find the output $y[n]$ when the input is $x[n] = \delta[n]$.
(b) Find the output $y[n]$ when the input is $x[n] = (1/3)^nu[n]$.

Problem 2. Continuous-time systems described by linear differential equations

Solve problem 2.33 in the textbook.

Problem 3. Block diagram representations

Draw the block diagram representations of the following causal LTI systems.

(a) $y[n] - \frac{1}{3}y[n-1] = \frac{1}{2}x[n]$
(b) $2y[n] - y[n-1] + y[n-2] = 3x[n] + x[n-1]$
(c) $\frac{dy(t)}{dt} + 3y(t) = x(t)$
(d) $\frac{d^2y(t)}{dt^2} - 2\frac{dy(t)}{dt} + 3y(t) = 5x(t) - 3\frac{dx(t)}{dt} + \frac{dx(t)}{dt}$

Problem 4. Cascaded LTI Systems

Solve problem 2.50 in the textbook.

(Honors Only) Problem 5. Impulse Response of an LTI system

Solve problem 2.46 in the textbook.