

**ECE 300**  
**Signals and Systems**  
Homework 3

**Due Date:** Thursday September 22 at 1 PM **Exam #1, Monday September 26**

**Reading:** K & H, pp. 114-128.

**Problems**

1. K & H, Problem 3.16 parts **a**, **c**, and **e**. Do these both analytically and graphically. You only need to plot the results for part **a**.
2. K & H, Problem 3.19. You need to think a little bit here about causality.
3. K & H, Problem 3.20.
4. K & H, Problem 3.22. You need to think again about causality. I would use graphical convolution. You should get  $y(t) = t^2 - 12t + 40$  for  $4 \leq t \leq 6$ .
5. K & H, Problem 3.26. (most of this one is pretty easy)
6. K & H, Problem 3.31 parts **a** and **b** only. This is pretty easy. You will have a differential equation for  $h(t)$  to solve (without Maple, use an integrating factor!)
7. K & H, Problem 3.29. This one is a bit tricky. For part **a**, you need to recognize that the signal just before the integrator is  $\frac{dy(t)}{dt}$ . Write a differential equation relating  $y(t)$  to  $x(t)$ . Next, let the input be the delta function and the output be the impulse response. You will have a simple differential equation you need to solve (without Maple, use an integrating factor!). You should ultimately get  $h(t) = \begin{cases} e^{-t} & 0 \leq t \leq c \\ 0 & t > c \end{cases}$   
For part **b**, just use the definition of convolution. You should have one answer for  $t \leq c$  and another for  $t > c$ .