Homework 4
Chapter 5
26.
28. a, b
35.

Class 1. a) Convolve $x(t)=\left(\frac{1}{T_0}\right)rect\left(\frac{t}{T_0}\right)$ with $h(t)=u(t)\frac{1}{RC}e^{-\frac{t}{RC}}$ to find the output y(t), for

a) T_0 = 0.1 and RC =0.5 Plot the result.

b) T_0 =1 and RC =0.5. Plot the result.

Confirm your answer with Approximate Impulse Response @
http://www.ittc.ku.edu/~frost/EECS_360/Mathematica-360/Impulse_Examples.cdf
Also look at Convolution with a Rectangular Pulse @
http://demonstrations.wolfram.com/ConvolutionWithARectangularPulse/

c) Is the result from part a) close to h(t), why?

d) Convolve $x(t)=\left(\frac{1}{T_0}\right)rect\left(\frac{t}{T_0}\right)$ with $h(t)=u(t-1)\frac{1}{RC}e^{-\frac{(t-1)}{RC}}$ for T_0 =1 and RC =0.5. Plot the result.

c) What is the relationship between the results in parts b) and d) above?

Hint: rect(t)=u(t+.5)-u(t-.5). The step response of a system is $h_{-1}(t)=h(t)*u(t)$, the step response is discussed on pp 176. Convolution is used to represent linear time invariant systems.

Class 2. Convolve $h(n)=.1(u(n)-u(n-10)$ with $x(n)=u(n)-u(n-10)$ Plot the result.
Confirm your answers with Discrete-Time Convolution. @
http://demonstrations.wolfram.com/DiscreteTimeConvolution/

Class 3. Let x(n) = 0, 1, 2 for n = 0, 1, 2 and h(n) = 3, 2, 1 for n = 0, 1, 2. Convolve x(n) with h(n) and plot the result. Confirm your answer with Convolution Sum. @
http://demonstrations.wolfram.com/ConvolutionSum/

Class 4. Convolve $\text{Rect}[\frac{t+15}{2}]+\text{Rect}[\frac{t-15}{2}]$ with $\text{Rect}[\frac{t+10}{2}]+\text{Rect}[\frac{t-10}{2}]$. Plot the result. (Hint: see problem Chapter 5-5c)

Class 5. Convolve $x(t)=t^2 rect(t-.5)$ and $h(t)=u(t)e^{-t}$.

Class 6. The system input, x(t)= $\frac{\mathrm{u(t-1)exp}(-(t-.5))}{\exp(-.5)} + \mathrm{rect}(t-.5)$ and impulse response, h(t)=rect(t-.5), are given below. Find the system output.