

EECS 361  
Homework #5

1. Section 3.5 Participation Activities
  - 3.5.1: Convolution properties.
  - 3.5.2: Convolution of two delayed rectangular pulses, using the properties.
  - 3.5.3: Convolution properties.
  - 3.5.4: Common convolutions.
  - 3.5.5: Using convolution properties.
2. Let  $h(t) = \text{rect}\left(\frac{t-20}{2}\right) + \text{rect}\left(\frac{t+20}{2}\right)$  and  $x(t) = \text{rect}\left(\frac{t-10}{2}\right) + \text{rect}\left(\frac{t+10}{2}\right)$ , find  $h(t)*x(t)$  and plot.
3. For  $x(t) = -\sin(\pi t)\text{rect}(t-5)$  and  $h(t) = u(t)$  find  $h(t)*x(t)$  and plot.
4. Find and plot the convolution of the following functions.
  - a.  $x(t) = u(t)e^{-t/2}$  and  $h(t) = u(t)e^{-t}$
  - b.  $x(t) = u(t)e^{-t/2}$  and  $h(t) = u(t)e^{-t/2}$
5. Let  $x(t) = 2\text{rect}(t - 1)$  and  $h(t) = 10 \text{rect}(t + 2)e^{0.8t}$ .
  - a.  $h(t)$  is a stable system, TRUE or FALSE
  - b.  $h(t)$  is a causal system, TRUE or FALSE
  - c. Find  $h(t)*x(t)$  and plot.
6. Let  $x(t) = \sum_{n=-\infty}^{\infty} \delta(t-2n)$  and  $h(t) = \text{tri}(t)$ , find  $h(t)*x(t)$  and plot. Is  $y(t)$  periodic, if so what is the period.
7. Section 3.6 Participation Activities
  - 3.6.1: BIBO stability and causality.
  - 3.6.2: BIBO stability.
  - 3.6.3: BIBO stability for complex exponential (sinusoidal) signals.
8. Exercise 3.6.1