ECE 2704: Signals & Systems

Summer-I 2004, 3 credits, CRN: 60318

Test#1

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1. Plot the signals
   $x(t) = (t+1)[u(t+1) - u(t)] + [u(t) - u(t-1)] + 2[u(t-1) - u(t-2)]$ and
   $x(t)u(1-t)$ (10 points)

2. Determine whether the following signals are energy signals or power or neither (10 points)
   a. $x(t) = e^{-at}u(t), a > 0$
   b. $x(t) = \sin(\omega_0 t + \theta)$

3. Verify the following (5 points)

$$\delta(t) = \frac{du(t)}{dt}$$

4. Evaluate the following (10 points)
   a. $\displaystyle\int_{-\infty}^{+\infty} \sin^2(t + \frac{\pi}{2})u(t-1)\delta(t)dt$

   b. $\displaystyle\int_{-\infty}^{+\infty} t\sin^2(t)\delta(\pi - t)dt$

5. Consider the following input-output system

$$y(t) = \mathbf{T}\{x(t)\} = \frac{1}{T}\int_{t-\frac{T}{2}}^{t+\frac{T}{2}} x(\tau)d\tau$$

   Determine whether the systems is (a) linear, (b) time-invariant, and (c) causal.