

October 1, 2007
Midterm Exam I
EE 3302: Signals and Systems

NOTE: Please, complete the following table and keep record of your assignment number.

First Name	
Last Name	
Student ID	
Assignment #	0

Exercise 1. Consider the continuous-time signal

$$x(t) = -2u(6t + 3)$$

where $u(t)$ is the causal unit step function.

A) Sketch and label carefully $x(t)$ [pt. 10].

Exercise 2. Consider the signal

$$x(t) = -2u(t + 2) + 2u(t - 2)$$

where $u(t)$ is the causal unit step function.

A) Derive the energy and the time-averaged power of signal $x(t)$ over $-\infty < t < \infty$ [pt. 10].

Exercise 3. A continuous-time LTI system has impulse response

$$h(t) = u(t) \sin(t)$$

where $u(t)$ is the causal unit step function.

A) Determine whether or not the system is [pt. 10]:

- memoryless,
- causal,
- stable.

Exercise 4. Consider the LTI system with the following input (x) output (y) relation

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

A) Derive, sketch and label the impulse response of the system, and determine whether or not the system is causal [pt. 15].

Exercise 5. Consider the discrete-time LTI system with impulse response

$$h[n] = \begin{cases} 1 & n = -1 \\ 1 & n = 1 \\ 0 & \text{otherwise} \end{cases}$$

The signal at the system input is

$$x[n] = \begin{cases} 1 & n = -1 \\ 1 & n = 0 \\ 1 & n = 1 \\ 0 & \text{otherwise} \end{cases}$$

A) Derive the expression of the signal at the output of the system. Sketch the output signal [pt. 20].

Exercise 6. Consider a continuous-time LTI system. The unit impulse response of the system is

$$h(t) = u(t) - u(t - 1)$$

where $u(t)$ is the causal unit step function. The signal at the system input is

$$x(t) = \delta(t + 2) + u(t) - u(t - 1)$$

where $\delta(t)$ is the unit impulse function.

A) Derive the output signal of the LTI system analytically, i.e., $y(t)$. Sketch and label carefully $y(t)$ [pt. 20].