

Fall 2018 - Mid-Term 1
ECE 301: Signals and Systems

Prof.Aly El Gamal

Last Name :

First Name :

PUID :

Instructions.

- Write your full name, PUID on this page
- This is a 50 minute exam containing 5 questions, 30 points each totaling 150 points.
- Please write clearly and legibly
- Your solutions must include detailed steps and/or explanations. Do not simply state the answer
- One A-4 sized crib sheet front and back is allowed.
- There should be 7 pages including the cover page.

Question	Points
1	
2	
3	
4	
5	
Total	

Problem 1

The output at time n for a system is obtained by accumulating the values of the input from $n + 7$ to ∞ .

a What is the impulse response?

b What is $y[n]$ when $x[n] = u[n] - u[n - 4]$, where $u[n]$ indicates unit step.

c Is this system

i Causal?

ii Memoryless?

iii Stable?

iv Invertible? If invertible find the impulse response of the inverse system.

Problem 2

For the following questions, determine if the signals are periodic or not. If periodic, find their fundamental period.

a . e^{-7jt}

b . $e^{5jt} + je^{10jt}$

c . e^{2t}

d . $e^{-2t}u(t)$

e . $\cos(7\pi n^3)$

f . $\cos(10\pi t) + \cos(3t)$

Problem 3

Calculate E_∞ and P_∞ for the following

a $x[n] = \sin(\frac{\pi}{4}n)$

b $x(t) = e^{j(5t - \frac{\pi}{8})}$

c $x[n] = u[n]$

d $x[n] = \delta[n]$

Problem 4

Find the convolution of the signals given below.

- a i $x(t) = u(t)$
 ii $h(t) = e^{-2t}u(t)$

- b i $x[n] = \delta[n] + \delta[n + 1] + \delta[n - 2]$
 ii $h[n] = u[n]$

Problem 5

a) For the signal $x(t)$ in Figure 1, sketch $x(-3t - 1)$

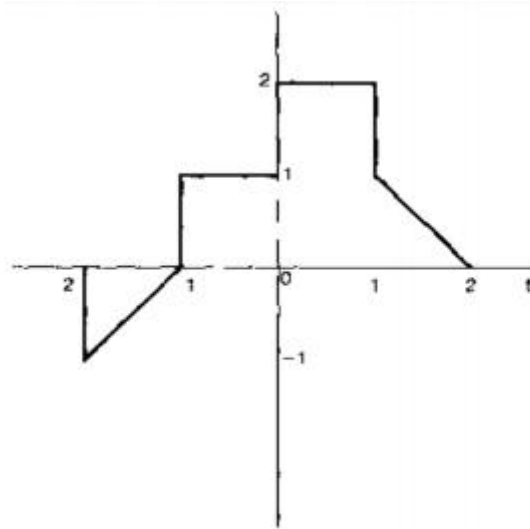


Figure 1: $x(t)$

b) Sketch $2u[-n-1]$ where $u[n]$ is a unit step function