Name <u>Answers</u>

EE-3220-11 – Dr. Durant – Quiz 2
Spring 2015, Week 2

1. (3 points) Indicate whether each of the following systems is linear, time-invariant, and causal. You ***do not*** need to show your work for this problem.

	$y_1(n) = x(n-3)$	$y_2(n) = x(n+2)$	$y_3(n) = nx^2(n-1)$
Linear?	+	+	—
Time-invariant?	+	+	—
Causal?	+	—	+

(−½) off by 1

2. (2 points) Write the non-0 portion of the sequence resulting from $x(n) = \left(\frac{1}{2}\right)^{-n}(u(n+2)-u(n-2))$. Recall that *u(n)* is the unit step that becomes 1 when the argument reaches 0. Clearly indicate the *n=0* position in your sequence.

3. (2 points) Express your sequence above as a weighted sum of shifted unit samples or deltas ($\delta(\cdot)$).

4. (1 point) Let the impulse response of a system be h(n) = [h(-1) h(0) h(1)] = [6 3 1]. Explain why this system is not causal.

5. (2 points) Calculate the convolution $y(n) = x_2(n)*h_2(n) = [5\ {-3}\ 2]*[7\ 5\ 2]$. Show your work (intermediate products; you are not required to show the formula for the convolution sum). Both sequences start at n=0. Indicate where *n=0* in your result

(2) $u(n+2)-u(n-2) = [1\ 1\ 1\ 1]$ (note: value of 0 @ n=2)
(↑ under the third 1)
so, effectively, n = −2:1 for non-zero values of x

$x = \left(\frac{1}{2}\right)^{-[-2\ -1\ 0\ 1]} = 2^{[-2\ -1\ 0\ 1]} = [\frac{1}{4}\ \frac{1}{2}\ 1\ 2]$ (↑ under 1)

(3) $x(n) = \frac{1}{4}\delta(n+2) + \frac{1}{2}\delta(n+1) + \delta(n) + 2\delta(n-1)$

(4) $h(-1) \neq 0 \rightarrow$ output occurs <u>before</u> input

(−¼) if align

(5) k=0, h(n−k), k=1, k=2

n / x(n)					
0	5*7 = 35	5*5 = 25	5*2 = 10		
1		−3*7 = −21	−3*5 = −15	−3*2 = −6	
2			2*7 = 14	2*5 = 10	2*2 = 4

y(n) = [35 4 9 4 4] (↑ under 35)