Name Answers

EE-3221-11 – Dr. Durant – Quiz 4
Winter 2017-'18, Week 4

1. (2 point) Draw a stem plot sketch of x(n) = 3δ(n + 2) for a reasonable range of n values.

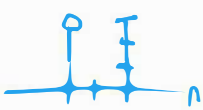
2. (3 points) Indicate whether each of the following systems is linear, time-invariant, and causal. You ***do not*** need to show your work for this problem.

	$y_1(n) = 3x(n) + 2x(n-4)$	$y_2(n) = \ln(x(n+1))$	$y_3(n) = nx^2(n-2)$
Linear?	+	− $\ln(a+b) \neq \ln(a)+\ln(b)$	− $(a+b)^2 \neq a^2+b^2$
Time-invariant?	+	+	− $n\cdot$
Causal?	+	− n+1 looks to future	+

3. (3 points) ***Calculate*** the first 4 samples of the unit ***step*** response of y(n) = (2/3)y(n–1) + 2 x(n) - x(n–1). Recall that the impulse response is y(n) when x(n) = u(n).

4. (2 points) ***Re-write*** the equation in standard form and then ***indicate*** the name of each coefficient (a_1, etc.).

(1)



(3)

n	x	y
0	1	$\frac{2}{3}\cdot 0 + 2\cdot 1 - 0 = 2$
1	1	$\frac{2}{3}\cdot 2 + 2\cdot 1 - 1 = 2\frac{1}{3}$
2	1	$\frac{2}{3}(2\frac{1}{3}) + 2\cdot 1 - 1 = 2\frac{5}{9}$
3	1	$\frac{2}{3}(2\frac{5}{9}) + 2\cdot 1 - 1 = 2\frac{19}{27}$

(Note: conversions to $\frac{b_0+b_1}{a_0+a_1} = \frac{2-1}{1/3} = 3$)

(4) $\underbrace{y(n)}_{a_0=1} \underbrace{-\frac{2}{3}}_{a_1} y(n-1) = \underbrace{2}_{b_0=2}x(n) \underbrace{-}_{b_1=-1} x(n-1)$

Name Answers

EE-3221-41 – Dr. Durant – Quiz 4
Winter 2017-'18, Week 4

---

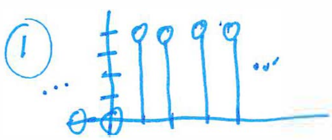
1. (2 point) Draw a stem plot sketch of x(n) = 4u(n – 1) for a reasonable range of n values.

2. (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.

	$y_1(n) = x(n-3) + 2x(n-4)$	$y_2(n) = nx^2(n+2)$	$y_3(n) = \cos(x(n-1))$
Linear?	+	− due to square	− $\cos(a+b) \neq \cos(a) + \cos(b)$
Time-invariant?	+	− due to n	+
Causal?	+	− due to $n+\underline{\underline{2}}$	+

3 ~~1~~. (3 points) ***Calculate*** the first 4 samples of the unit ***impulse*** response of y(n) = 4y(n–1) - 3x(n) +2x(n–1). Recall that the impulse response is y(n) when x(n) = δ(n).

4 ~~2~~. (2 points) ***Re-write*** the equation in standard form and then ***indicate*** the name of each coefficient (a_1, etc.).

① 

③

n	x	y
0	1	−3
1	0	$4 \cdot -3 - 3 \cdot 0 + 2 \cdot 1 = -10$
2	0	−40
3	0	−160

④ $\underbrace{y(n)}_{a_0=1} \underbrace{-4}_{a_1} y(n-1) = \underbrace{-3}_{b_0} x(n) + \underbrace{2}_{b_1} x(n-1)$