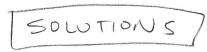
Quiz #5

ECEn 380: Signals & Systems



Fall 2014

Closed book, closed note, closed neighbor, no calculators allowed. Time limit is 15 minutes. 20 points total possible.

1. Consider a discrete-time system described by the input/output relationship:

$$y[n] = 3x[n] - 2x[n-1] + x[n-3]$$

- a. Is this system LTI? (2 pts) TES. SYSTEM IS A MOVING AVERAGE (MA)
- b. Find the system's impulse response h[n]. (3 pts)

c. Find the output of the system if the input is $x[n] = \{ 1, 3, -1 \}$. (3 pts)

$$\frac{3}{9} - \frac{2}{9} = \frac{3}{3} + \frac{7}{9} + \frac{9}{3} + \frac{3}{3} + \frac{13}{9}$$
Experiment the signal viril given in part (a) (3 pts)

d. Find the unilateral z-Transform of the signal x[n] given in part (c). (3 pts)

$$X(z) = |+3z^{-1}-z^{-2}| = |+\frac{3}{2}-\frac{1}{z^2}|$$

2. Find the unilateral z-Transform of the following signals, and **state the region of convergence (ROC).** In other words, state for what values of z the z-Transform converges.

a.
$$x[n] = 2\delta[n-3] - 3\delta[n-4]$$
 (3 pts)
 $X(z) = 2z^{-3} - 3z^{-4} = \frac{2}{z^3} - \frac{3}{z^4}$ [DOC: $z \neq 0$]

b.
$$x[n] = (\frac{1}{2})^{n+1}u[n]$$
 (3 pts)
$$= \frac{1}{2}(\frac{1}{2})^nu[n]$$

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c. $x[n] = e^{j\pi n/2}u[n]$ (3 pts)

$$X(z) = \frac{z}{z - e^{j\pi n/2}} = \frac{z}{z - j^n} \frac{eoc}{|z| > 1}$$