

## **Quiz #6** ECEn 380 – Fall 2015

You have 10 minutes to complete the following quiz. Closed book, closed note, and closed neighbor.

1. Find the Discrete Time Fourier Transform (DTFT) of  $x[n] = \{1, 2, 1\}$ . Simplify your answer until there are no complex exponentials left for full credit. (5 pts)

$$X(e^{j2}) = \sum_{n=-\infty}^{\infty} x(n)e^{-j2n} = 1 \cdot e^{-j2n(-1)} + 2e^{-j2n(0)}$$

$$= 2 + e^{j2n} + e^{-j2n} = 1 \cdot e^{-j2n(0)}$$

$$= 2 + e^{j2n} + e^{-j2n} = 1 \cdot e^{-j2n(0)}$$

2. What is the DC component of the signal from the last problem? (3 pts)

APOLOGIES, BUT IT THENS OUT THIS IS AN AMBIGUOUS QUESTION, SINCE I DIDN'T SPECIFY WHETHER I MEATHET THE DC COMPONENT OF XTAZ OR THE DC COMPONENT OF X(e).

3. Consider the DTFT of a signal x[n]. You know that  $X(e^{j2\pi/3}) = 4j$ . What is  $X(e^{j8\pi/3})$ ? (4 pts)

OF X(n) IS 4.

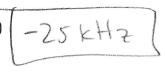
THE DE COMPONENT

OF X(el2) IS

2.

- 4. If a signal x[n] is periodic, real, and even, and you are given that the Fourier Series Coefficient  $x_1 = 3$ , what is the Fourier Series Coefficient  $x_{-1}$ ? (4 pts)
- 5. Suppose I sample a continuous-time signal that is band-limited to <25kHz at a sampling frequency of 50kHz, and then take a finite number of those samples and load them into a Matlab vector x. I then perform the following operation:

What frequency does y[1] represent in kHz? (4 pts)



(X(N)=)4)

B

MORE

NATURAL

INTERPRETATION,

BUT I

ACCEPTED

ETHER.