EE3221 Homework 6 Dr. Prust Assigned: 1 May 2020 Due: 8 February 2020 (1:00PM CDT)

Note: Problems from the course textbook (Ulaby and Yagle, 2018) are specified with the prefix "UY".

- 1. Consider the discrete-time signal x[n] = u[n+2] u[n-3].
 - (a) Find $X(e^{j\Omega})$. Simplify your answer to be a sum of sines and cosines.
 - (b) Make an approximate sketch of $|X(e^{j\Omega})|$.

SELECTED ANSWERS: (a) $X(e^{j\Omega}) = 1 + 2\cos(\Omega) + 2\cos(2\Omega)$

- 2. Consider the discrete-time system having impulse response $h[n] = \{\underline{1/3}, 1/3, 1/3\}$. Note that its frequency response $H(e^{j\Omega})$ is the DTFT of h[n].
 - (a) Find $H(e^{j\Omega})$ using the DTFT equation. Simplify your answer to be a complex exponential term multiplied by a sum of sines and cosines
 - (b) Find expressions for $|H(e^{j\Omega})|$ and $\angle H(e^{j\Omega})$.
 - (c) Make approximate sketches of $|H(e^{j\Omega})|$ and $\angle H(e^{j\Omega})$.

SELECTED ANSWERS: (a) $H(e^{j\Omega}) = \frac{1}{3}e^{-j\Omega}(1+2\cos(\Omega))$; (c) Use MATLAB to confirm your answer

3. UY 7.46

ANSWER: $x[n] = \{6, 4, \underline{3}, -2, -2\}$

4. UY 7.48 (b)

ANSWER: the integral equals 1