EE3221 Homework 3 Dr. Prust Assigned: 3 April 2020 Due: 9 April 2020 (1:00PM CDT)

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

Submit for Credit:

1. UY 7.8

HINT: Note that the input $\{\underline{1}, 1\}$ equals $\delta[n] + \{\underline{0}, 1\} = \delta[n] + \delta[n-1]$.

- 2. Consider the discrete-time moving average (MA) system y[n] = 2x[n] x[n-1] + 2x[n-3].
 - (a) Find the system impulse response h[n].
 - (b) Is the system causal? Justify your answer.
 - (c) Is the system BIBO stable? Justify your answer.

ANSWERS: $h[n] = \{\underline{2}, -1, 0, 2\}$, causal, BIBO stable

3. UY 7.10

HINT: You can quickly and easily check your convolution calculations using the conv function in MATLAB. For example, the answer for part (a) can be found using >> conv([3 4 5],[6 7 8])

ANSWERS:

- (a) $\{\underline{18}, 45, 82, 67, 40\}$
- (b) $\{\underline{1}, 3\}$
- (c) $\{\underline{3}, 7, 12, 9, 5\}$
- (d) $\{\underline{0}, 0, 2, 4, 8\}$
- 4. Compute and plot y[n] = x[n] * h[n] where

$$\begin{array}{rcl} x[n] &=& u[n] - u[n-8] \\ h[n] &=& u[n+1] - u[n-2] \end{array}$$

ANSWER: {1, 2, 3, 3, 3, 3, 3, 3, 2, 1}

5. UY 7.13

ANSWER: $\{\underline{15}, -22, 8\}$