

EECS 361
Homework #12

1. Section 6.1 Participation Activities
 - 6.1.1: Transformations for Digital Signal Processing (DSP)
 - 6.1.2: Discrete-time signal transformations.
 - 6.1.3: Discrete-time signal durations and transformations
2. Section 6.2 Participation Activities
 - 6.2.1: Sampling rate and discrete-time period and frequency
 - 6.2.2: Discrete-time periodic parameters.
 - 6.2.3: Periodic parameter values.
 - 6.2.4: Periodic continuous-time vs. discrete-time functions.
 - 6.2.5: Discrete sinusoids.
3. Section 6.2 Challenge Activity
 - 6.2.1: Discrete-time signal functions
4. Convert each of these signals into the finite sequence form $\{a, b, c, \dots\}$
 - a. $u[n-1] + \delta[n-4] - u[n-5]$
 - b. $(n-1)u[n] - (n-1)u[n-3]$
 - c. $5\delta[n] + 5\delta[n+1] + 5\delta[n-1]$
5. Section 6.3
 - 6.3.1: Discrete-time system terminology
6. Section 6.4 Participation Activities
 - 6.4.1: Properties of discrete-time systems, part one.
 - 6.4.2: Properties of discrete-time systems, part two.
 - 6.4.3: Impulse response of MA (moving average) system.
 - 6.4.4: Step response of moving average system.
 - 6.4.5: ARMA system, impulse and step responses.
 - 6.4.6: ARMA system, $|p| < 1$ impulse and step responses.
 - 6.4.7: Discrete-time system stability.
7. Section 6.4 Challenge Activity
 - 6.4.1: Properties of discrete-time LTI systems
8. Classify the following systems as causal and/or stable.
 - a. $h[n] = 5\delta[n] + 4\delta[n+1] + 4\delta[n-1]$
 - b. $h[n] = nx[n]$
9. Classify the following systems as linear and/or time-invariant.
 - a. $y[n] = 10x[n] + 3$
 - b. $y[n] = 3x[n] - 2x[n-1]$
 - c. $y[n] = (n-1)x[n]$
10. Section 6.5 Participation Activities
 - 6.5.1: Example: delayed-impulses convolution method.
 - 6.5.2: Delayed-impulses convolution, input
 - 6.5.3: Discrete-time convolution via delayed impulses.
 - 6.5.4: Graphical or textual sliding convolution.
 - 6.5.5: Graphical convolution process.
 - 6.5.6: Graphical convolution values.

11. Compute the following convolutions

- a. $\{8, 4\} * \{6, 7, 8\}$
- b. $\{3, 2, 3\} * \{1, 0, 2\}$
- c. $\{0, 2, 4\} * \{1, 0, 2, 0, 3\}$
- d. $\{1, 1\} * \{1, 1, 1, 1, 1\}$
- e. $\{1, 1, 1, 1, 1\} * \{1, 1, 1, 1, 1\}$

12. Find the system impulse response for a system defined by the following input, $x[n]$ output, $y[n]$ relationship $y[n] = 5x[n] + 4x[n+1] + 4x[n-1]$. Is this system causal? Is this system stable?