ECE 381 Introduction to Digital Signal Processing
Spring 2020, 1:30pm - 2:45 pm TR

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Project 1
Due on Mar. 5th, 2020.

1.) Read Matlab session 3: "Discrete-time signals and systems" in the textbook. Practice those Matlab functions.

2.) Generate the following function sequences. Plot signal samples using the stem function with the time information, for example, stem(n, x_1).

a. $x_1[n] = u[n] - u[n- 30]$;
b. $x_2[n] = u[n + 10] - u[n - 20]$;
c. $x_3[n] = (1/2)^n(u[n + 5] - u[n - 20])$;

3.) A causal LTID system is described by the second-order discrete-time system as,

$$y[n] – 0.8y[n - 1] + 0.12y[n - 2] = x[n] \quad (1)$$

a. Use the method described in section M3.2 to compute the impulse response through filtering for $n = (0:25)$.
b. Use Matlab function impz() to compute impulse response for the system, $h[n]$, for $n = (0:25)$. Plot $h[n]$. Did you get the same result as that in (a)? Plot $h[n]$, and the difference between $h[n]$*'s* in part (a) and part (b).
c. Suppose the input for the system is

$$x[n] = u[n] - u[n - 15] \quad (2)$$

with initial condition $y[-1] = y[-2] = 2$, compute the zero-input response, y_{zi}, the zero-state response, y_{zs} and the total response, $y[n]$.

Turn in your code and plots, make a cover page for your report.