EC401 HW02 Spring 2020

Due Date: Wednesday Feb 05, 2020

You must submit your homework on paper (all pages of your submission stapled together) during the first 10 minutes of lecture on the due date. Please be sure to write your name on the first page of the homework you submit. Additionally, if you have collaborated on the homework with other individuals enrolled in EC401 this semester, please identify them as your collaborators on the first page of the submitted homework.

HW02.1

Sketch each of the following signals, where $u[n]$ represents the unit step ("switch") and $\delta[n]$ represents the unit impulse ("atom"). Also, perform *end-points analysis* to verify each of your answers.

a) $\delta[n+5]$

b) $\delta[-n-2]$

c) $4u[n+5]$

d) $u[-2n]$

e) $3u[-n+1]$

HW02.2

Sketch each of the following signals, where $u[n]$ represents the unit step ("switch") and $\delta[n]$ represents the unit impulse ("atom").

a) $u[n]-u[n-5]$

b) $u[n+2]-u[n-3]$

c) $\sum_{k=0}^{5}\delta[n-k]$

d) $\sum_{k=0}^{5}\delta[n-2k]$

e) $(0.5)^n\{u[n]-u[n-5]\}$

HW02.3

Consider a discrete-time signal given as:

$$x[n]=(n+1)\{u[n]-u[n-3]\}+(5-n)\{u[n-3]-u[n-5]\}$$

where $u[n]$ is the unit step.

a) Sketch $x[n]$

b) Determine the numerical values of $\alpha_0, \alpha_1, \alpha_2, \alpha_3$ and α_4 in the impulse ("atomic") decomposition of $x[n]=\sum_{k=0}^{4}\alpha_k\,\delta[n-k]$

b) Sketch $x[-n+4]$

HW02.4

Let $x[n] = \sum_{k=-\infty}^{\infty} \delta[n-4k] + \delta[n-1-4k]$

a) Sketch $x[n]$

b) Sketch $x[n-4]$ and $x[n-8]$

HW02.5

Use MATLAB to plot the signal $x[n] = \begin{cases} 0.25 & n = 0 \\ \dfrac{\sin(0.25\pi n)}{\pi n} & n \neq 0 \end{cases}$. In your plot, the range of values for n should be $-16 \le n \le 16$. For what values of n is your does your plot show the values of $x[n]$ to be zero? Explain why that makes sense.