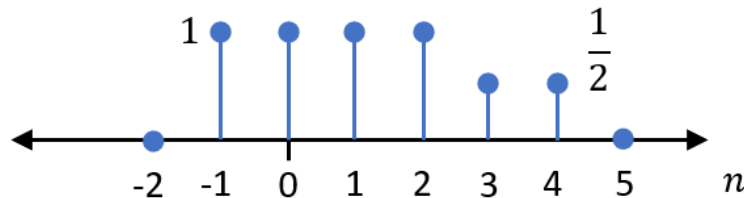


COE150: DIGITAL SIGNAL PROCESSING

QUIZ #1

(60pts)

- Sketch the following signals for the discrete time signal shown below: (15)
 - $x[4 - n]$
 - $x[n]\delta[n - 3]$
 - Even part of the signal



- A discrete-time signal $x[n]$ is defined as: (20)

$$x[n] = \begin{cases} 1 + \frac{n}{3}, & -3 \leq n \leq 1 \\ 1, & 0 \leq n \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

- Sketch the signal.
 - Sketch the signal $x[2n]$.
 - Express the signal in terms of $u[n]$.
 - Express the signal in terms of $\delta[n]$.
- Find the convolution of the signal $x[n] = u[n] - u[n - 3]$ and the system impulse response of $h[n] = u[n - 2] - u[n - 4] + 2u[n - 6] - 2u[n - 9]$. Using: (10)
 - Direct method
 - Convolution sum
 - (a) Express the overall impulse response of the interconnection of LTI systems below in terms of $h_1[n]$, $h_2[n]$, $h_3[n]$ and $h_4[n]$. (5)
 - Determine the overall impulse response $h[n]$ when: (10)

$$h_1[n] = \left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{2} \right\}$$

$$h_2[n] = h_3[n] = \{1, -1, -1\}$$

$$h_4[n] = \delta(n - 1)$$

