

Spring 2019 - Quiz 2  
ECE 301: Signals and Systems

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**Problem 1**

Consider a Discrete-Time LTI system, where the output at each time  $n$  is obtained by accumulating the values of the input from  $n + 1$  to  $n + 2$ .

- a What is the impulse response?
- b What is  $y[n]$  when  $x[n] = u[n + 3] - u[n + 4]$ , where  $u[n]$  indicates the unit step signal?
- c Is this system
  - i Causal?
  - ii Memoryless?
  - iii Stable?
  - iv Invertible? If so, what is the inverse system? If not, justify your answer.
- d Repeat c-iv) when the output at each time  $n$  is obtained by accumulating the input from  $n + 1$  to  $\infty$ .

## Problem 2

Consider a linear system, where the response to an input signal  $x[n] = \delta[n - k]$  is given by

$$y[n] = \begin{cases} \delta[n], & \text{if } k \text{ is even,} \\ \delta[n - 1], & \text{if } k \text{ is odd.} \end{cases}$$

Is this system time invariant? What is the output to  $x[n]$  in Figure 1 (all values that are not shown in the figure equal zero)?

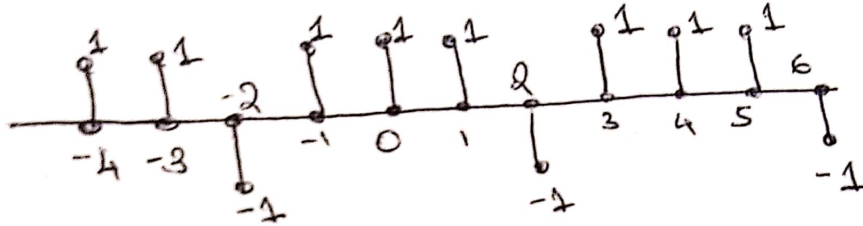


Figure 1:  $x[n]$