

EE3210 Signals and Systems

Tutorial 5

Problem 1: Consider a discrete-time LTI system with unit impulse response

$$h[n] = \left(\frac{1}{2}\right)^n u[-n].$$

Determine whether the system is causal and/or stable. Justify your answers.

Problem 2: Consider a continuous-time LTI system with unit impulse response

$$h(t) = e^{-6|t|}.$$

Determine whether each system is causal and/or stable. Justify your answers.

Problem 3: Consider a discrete-time LTI system with the response $y[n]$ to a unit step signal, i.e., $x[n] = u[n]$, given by

$$y[n] = \begin{cases} 1, & 0 \leq n \leq 7 \\ 0, & \text{elsewhere.} \end{cases}$$

Determine:

- (a) The unit impulse response $h[n]$ and the stability of this system.
- (b) The linear constant-coefficient difference equation that characterizes this system.
- (c) The block diagram representation of this system.