

# EE3210 Signals and Systems

## Tutorial 6

**Problem 1:** The following are the impulse responses of discrete-time LTI systems. Determine whether each system is causal and/or stable. Justify your answers.

(a)  $h[n] = (\frac{1}{5})^n u[n]$

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

**Problem 2:** The following are the impulse responses of continuous-time LTI systems. Determine whether each system is causal and/or stable. Justify your answers.

(a)  $h(t) = e^{-4t} u(t - 2)$

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

**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.