Australian National University

Research School of Engineering
College of Engineering and Computer Science

ENGN2228 Signal Processing

HOMEWORK 6

Homework 6-1

Determine whether each of the following systems, where $x(t)$ or $x[n]$ is the input signal and $y(t)$ or $y[n]$ is the output signal, are: i) linear, ii) time-invariant, and iii) causal and iv) Memoryless.

System	Linear	Time-Invariant	Causal	Memoryless
$y(t) = x(t-1)$				
$y[n] = x[1-n]$				
$y(t) = 2x(t) + 3$				
$y(t) = x(5t)$				
$y(t) = x(t/5)$				
$y(t) = \text{Real}\{x(t)\}$				
$y[n] = \sum_{k=0}^{\infty} x[k]$				
$y[n] = \sum_{k=-10}^{n-3} x[k]$				
$y(t) = \sin\left(2\pi x(t/5)\right)$				
$y[n] = \cos(2\pi n)x[n]$				
$y[n] = \cos(\pi n)x[n]$				
$y[n] = \sum_{k=-10}^{5} x[k]$				

Homework 6-2

If a system is memoryless is it causal?

Homework 6-3

If a system is non-causal can it be memoryless?