

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE310 Signals and Systems
Quiz 2 Solutions

Name: _____

Campus ID: _____

Total Marks: 10

Time Duration: 20 minutes

Question 1 (6 marks)

Determine whether each of the following systems described by an input-output relationship (where $x(t)$ or $x[n]$ is the input and $y(t)$ or $y[n]$ is the output) is: (i) linear, (ii) time-invariant, (iii) causal, and (iv) stable (BIBO). Fill the table by writing **Y** (yes) or **N** (no) in each entry. For any entry marked with **J**, provide a brief justification.

System	Linear	Time-Invariant	Causal	Stable
$y(t) = t x(t - 2)$				
$y[n] = x[n] - x[n - 4]$				
$y[n] = \sum_{k=n}^{\infty} x[k]$		J		
$y[n] = \sum_{k=-\infty}^n (0.7)^{n-k} x[k]$			J	

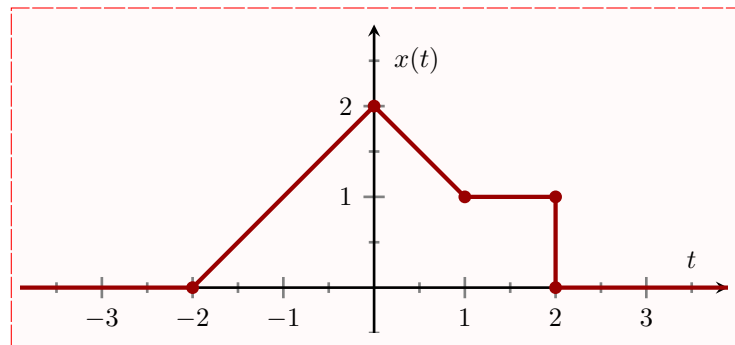
Solution:

System	Linear	Time-Invariant	Causal	Stable
$y(t) = t x(t - 2)$	Y	N	Y	N
$y[n] = x[n] - x[n - 4]$	Y	Y	Y	Y
$y[n] = \sum_{k=n}^{\infty} x[k]$	Y	Y	N	N
$y[n] = \sum_{k=-\infty}^n (0.7)^{n-k} x[k]$	Y	Y	Y	Y

- For $y[n] = \sum_{k=n}^{\infty} x[k]$, the system is time-invariant since shifting the input by n_0 yields $T\{x[n - n_0]\} = \sum_{k=n}^{\infty} x[k - n_0] = \sum_{m=n-n_0}^{\infty} x[m] = y[n - n_0]$.
- For $y[n] = \sum_{k=-\infty}^n (0.7)^{n-k} x[k]$, the system is causal because the output at time n depends only on input samples $x[k]$ with $k \leq n$ (present and past), and not on any future values.

Question 2 (4 marks)

For the CT signal $x(t)$ shown below,



sketch and carefully label $x(2 - t/3)$.

Solution:

