Assignment -1
Signals & Systems: ECE250
Monsoon-2024

Release: 30-Aug-2024 (10:15 PM) **Submission:** 3-Sep-2024 (12:15 PM)

Instructions

- **Institute Plagiarism Policy Applicable.** This will be subjected to strict plagiarism check.
- This assignment should be attempted individually.
- A maximum point for this assignment is **28**. All questions are compulsory.
- Submit a hard copy of your solutions in the wooden box kept on the 3rd Floor of Old Academic Block (right side of the lift). Write your Name, Roll No. on the hard copy of your solutions.
- **Submission Policy:** Expect **No Extensions**. Late submissions will not be evaluated and hence will be awarded zero marks strictly.
- **Clarifications:** Symbols have their usual meaning. Assume the missing information & mention it in the report. Use Google Classroom for any queries. In order to keep it fair for all, no email queries will be entertained.
- There could be multiple ways to approach a question. Please justify your answers. Questions without justification will get zero marks.

[CO1] Q1: Find the average power of $y(t)$. Where $y(t) = x(\frac{t-1}{2})$ and the waveform of signal $x(t)$is shown in the below figure-1. **[4 Points]**

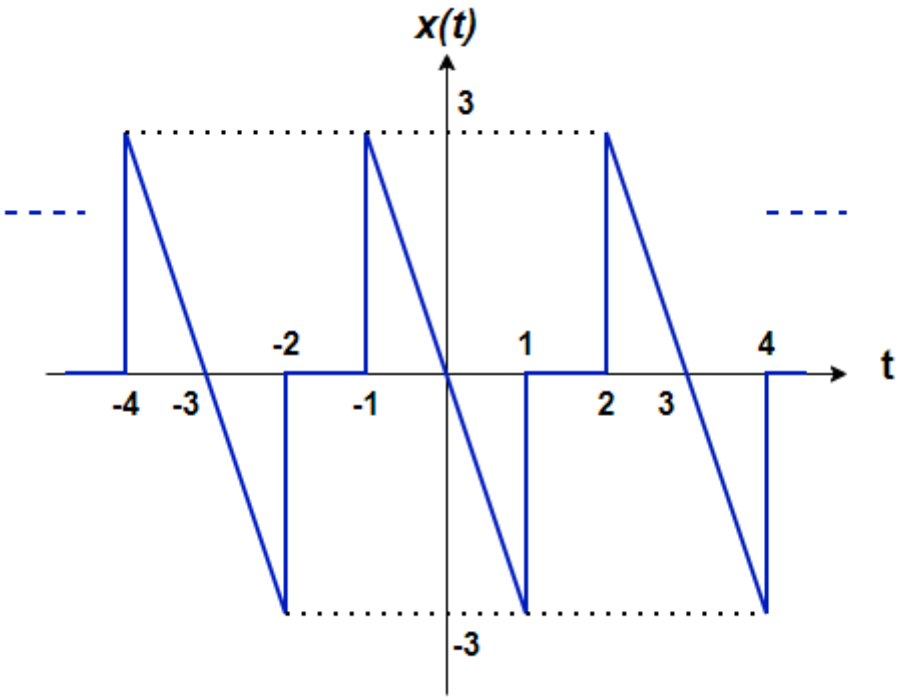

Figure 1

[CO1, CO2] Q2: A discrete-time system has the input-output relationship,

$$y[n] = \begin{cases} x[n] & n \geq 1 \\ 0 & n = 0 \\ x[n+1] & n \leq -1 \end{cases}$$

Where $x[n]$ is the input and $y[n]$ is the output. Check system is Linear or Non-Linear, Time-invariance or Time-variance, Causal or Non-Causal, Stable or Unstable. **[4 Points]**

[CO1, CO2] Q3: For the given following systems, check system is Linear or Non-Linear, Time-invariance or Time-variance, Causal or Non-Causal, Stable or Unstable. (For zero initial condition) **[16 Points]**

a) $y[n+2] + y[n+1] + y[n] = 2x[n+1] + x[n]$
b) $n^2 y^2[n] + y[n] = x^2[n]$
c) $y[n+1] + ny[n] = 4nx[n]$
d) $y[n+1]y[n] = 4x[n]$

[CO1] Q4: Let

$$V = \{\begin{bmatrix} r \\ s \\ t \end{bmatrix} \in R^3 | x - y + 2z = 0\}$$

Find the dimension of V? **[4 Points]**