

### Digital Assignment 1 (Fall Semester 2022-2023)

Submission Deadline: 9 Sept 2022

Submission Mode: Digital (Moodle)

Slot: G1+TG1 and G2+TG2

Full Marks: 10

Faculty: Dr. Jeetashree Aparajeeta

(All questions are compulsory. Each question carry 0.5 marks)

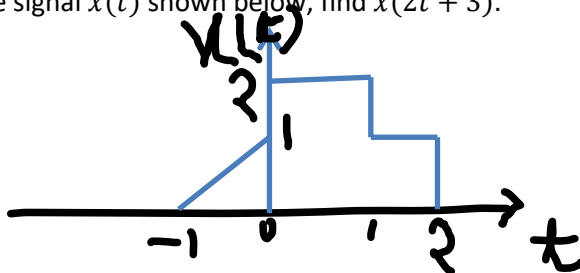
Q1. Plot  $x(t) = u(t - 1) + u(t - 2) + u(t - 3)$

Q2. Plot  $x(t) = u(t - 1) + 2u(t - 2) + 3u(t - 3)$

Q3. Plot  $x(t) = 2r(t)$  and  $x(t) = -2r(t)$

Q4. Solve  $\int_{-\infty}^{\infty} t^2 \delta(t - 3) dt$

Q5. For the signal  $x(t)$  shown below, find  $x(2t + 3)$ .



Q6. Plot  $r(t)u(2 - t)$ .

Q7. Find if  $x(t) = \sin 50\pi t$  and  $x(t) = 4 \cos 5\pi t$  are periodic or aperiodic.

Q8. Find if  $e^{-5t}u(t)$  and  $t^2u(t)$  are energy or power signals.

Q9. Find if  $\left(\frac{1}{2}\right)^n u(n)$  and  $r(n) - r(n - 4)$  are energy or power signal.

Q10. Find if  $e^{2t}u(t - 1)$  is causal or non-causal.

Q11. Find if  $t^2$  is even or odd signal.

Q12. Find the even and odd components of  $\cos(\omega_0 t + \frac{\pi}{2})$ .

Q13. Find the even and odd components of the signal

N	-2	-1	0	1	2
x[n]	-3	1	2	-4	2

Q14. A rectangular function  $f(t)$  is defined by,

$$f(t) = \begin{cases} 1 & 0 < t < \pi \\ -1 & \pi < t < 2\pi \end{cases}$$

Approximate this function by a waveform 'sin  $t$ ' over the interval  $(0, 2\pi)$  such that the mean square error is minimum.

Q15. Find if  $y[n] = nx^2[n]$  is Linear Time Variant (LTI) system or Linear Time Invariant system.

Q16. Find if  $y(t) = 2x^2(t)$  is static system or Dynamic system.

Q17. Find if  $y(t) = 2x(t) + \frac{1}{x(t)}$  is causal or Non-causal system.

Q18. Find if  $y(t) = 2x^2(t)$  is a stable system or unstable system.

Q19. Check if the three vectors V1, V2 and V3 are linearly dependent or Independent if,

$$V1 = 2 - x - 4x^2$$

$$V2 = 3 + 6x + 2x^2$$

$$V3 = 2 + 10x - 4x^2$$

Q20. Check if the three vectors X1 and X2 are linearly dependent or Independent, if

X1 = [1 3 4] and X2 = [-2 -6 -8].