

19ECE203 – Signals and Systems

Assignment 1

Due Date : 30th April 2022

Question 1 :

A discrete-time signal is shown in Figure P1.22. Sketch and label carefully each of the following signals:

- | | | |
|--|--------------------|-----------------------------|
| (a) $x[n - 4]$ | (b) $x[3 - n]$ | (c) $x[3n]$ |
| (d) $x[3n + 1]$ | (e) $x[n]u[3 - n]$ | (f) $x[n - 2]\delta[n - 2]$ |
| (g) $\frac{1}{2}x[n] + \frac{1}{2}(-1)^n x[n]$ | (h) $x[(n - 1)^2]$ | |

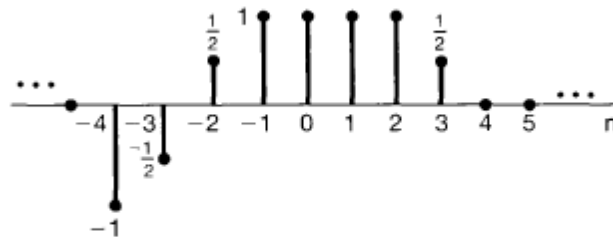


Figure P1.22

Question 2 :

A continuous-time signal $x(t)$ is shown in Figure P1.21. Sketch and label carefully each of the following signals:

- | | | |
|--------------------------|--------------------------|---|
| (a) $x(t - 1)$ | (b) $x(2 - t)$ | (c) $x(2t + 1)$ |
| (d) $x(4 - \frac{t}{2})$ | (e) $[x(t) + x(-t)]u(t)$ | (f) $x(t)[\delta(t + \frac{3}{2}) - \delta(t - \frac{3}{2})]$ |

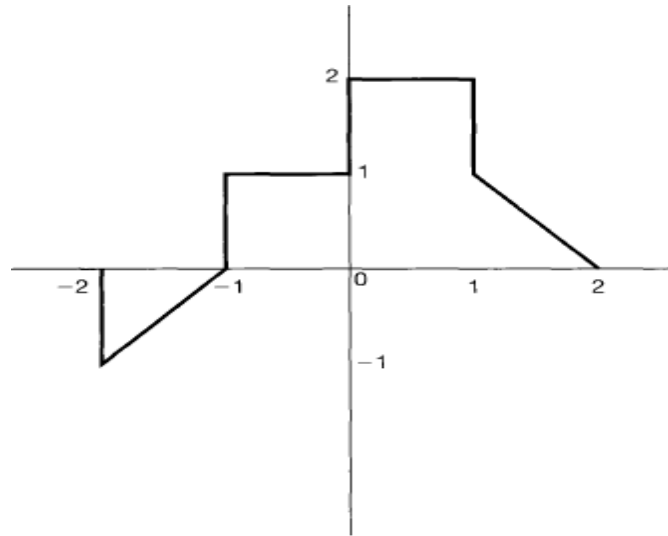


Figure P1.21

Question 3 :

Problem: Consider the circuit shown below. Determine if the system is (i) memoryless, (ii) causal, (iii) linear, (iv) time-invariant, or (v) stable.



Question 4 :

Determine the properties for each of a following discrete time system. Justify your answers.

- (a) $y[n] = x[-n]$ (b) $y[n] = x[n - 2] - 2x[n - 8]$
 (c) $y[n] = nx[n]$ (d) $y[n] = \mathcal{E}_v\{x[n - 1]\}$
 (e) $y[n] = \begin{cases} x[n], & n \geq 1 \\ 0, & n = 0 \\ x[n + 1], & n \leq -1 \end{cases}$ (f) $y[n] = \begin{cases} x[n], & n \geq 1 \\ 0, & n = 0 \\ x[n], & n \leq -1 \end{cases}$
 (g) $y[n] = x[4n + 1]$