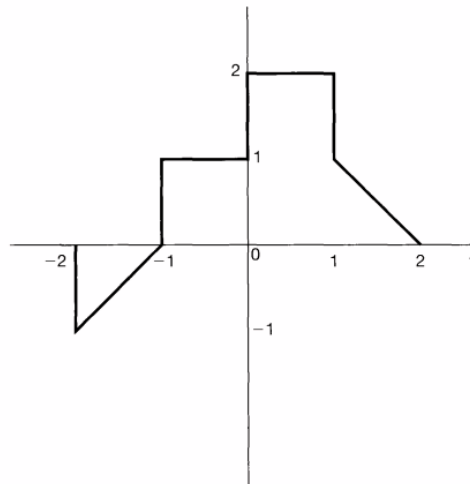


Tutorial 1 Questions

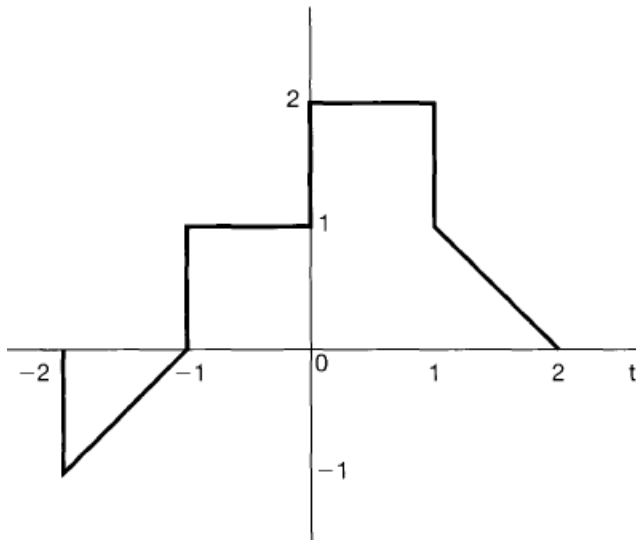
1. A continuous-time signal $x(t)$ is shown in the figure. Sketch and label the following signal.

- a) $x(t - 1)$
- b) $x(2 - t)$
- c) $x(2t + 1)$
- d) $x(4 - \frac{t}{2})$



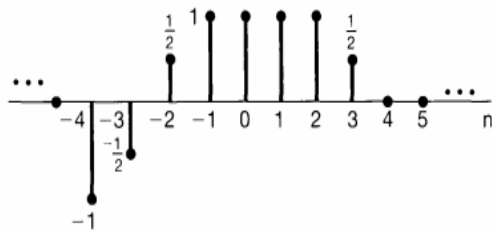
2. A continuous-time signal $x(t)$ is shown in Figure. Sketch and label carefully each of the following signals:

- (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) $x(t)[\delta(t + \frac{3}{2}) - \delta(t - \frac{3}{2})]$

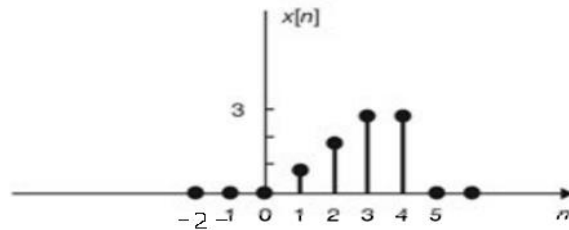


3. A discrete-time signal $x[n]$ is shown in the figure. Sketch and label the following signal

- a) $x[n - 4]$
- b) $x[3 - n]$
- c) $x[3n]$
- d) $x[3n + 1]$



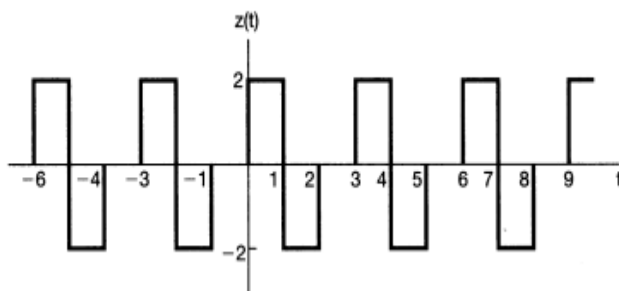
4. A discrete-time signal $x[n]$ is shown below. Sketch and label each of the following signals.



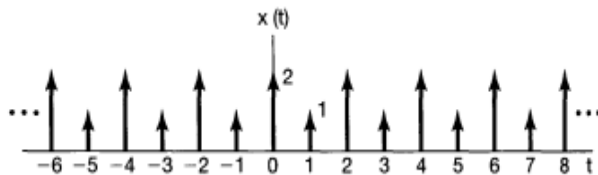
- (a) $x[n - 2]$
- (b) $x[2n]$
- (c) $x[-n]$
- (d) $x[-n + 2]$

5. Check whether the given signals are analog or digital

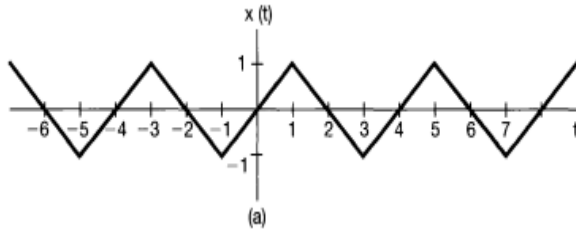
a)



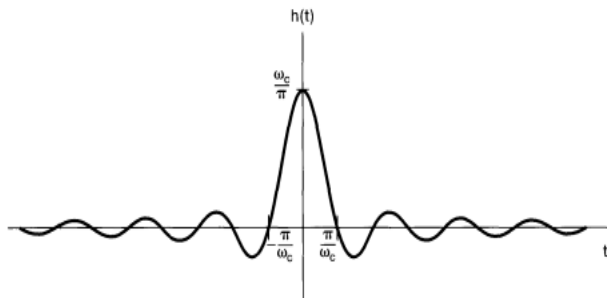
b)



c)



d)



6. Determine whether the signal given below is periodic or aperiodic

- $x(t) = 3\cos(4 + \frac{\pi}{3})$
- $x(t) = \left[\cos\left(2t - \frac{\pi}{3}\right)\right]^2$
- $x(t) = \sin 10\pi t$
- $x(t) = \sin(2t) + \cos(3\pi t)$

7. Determine whether the discrete signal given below is periodic or aperiodic

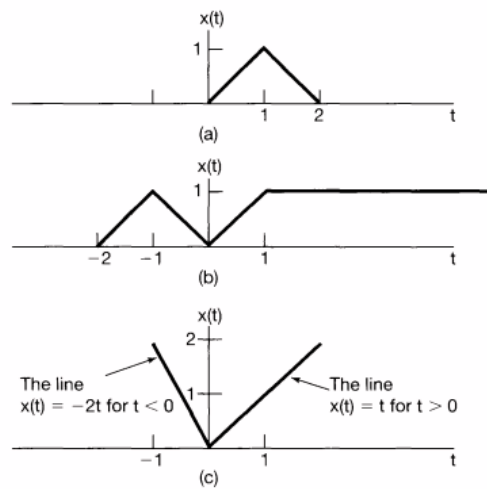
- $x[n] = \sin\left(\frac{6\pi}{7}\right)n + 1$
- $x[n] = \cos\left(\frac{n}{8} - \pi\right)$
- $x[n] = \cos\left(\frac{\pi}{2}n\right)\cos\left(\frac{\pi}{4}n\right)$
- $x[n] = u[n] + u[-n]$

8. Determine the fundamental period of the signal

- $x(t) = 2\cos(10t + 1) - \sin(4t - 1)$
- $x(t) = \cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{3\pi}{4}\right) + \cos\left(\frac{6\pi}{5}\right)$
- $x[n] = 1 + e^{j4\pi n/7} - e^{j2\pi n/5}$

9. Find whether the signal is odd or even

- $x(t) = e^{-5t}$
- $x(t) = \sin 2t$
- $x(t) = \cos 5t$
- Determine and sketch the even and odd part of the signals given below



10. Determine the values of P_∞ and E_∞ for each of the following signals:

- (a) $x(t) = e^{-2t}u(t)$
- (b) $x(t) = \cos(t)$
- (c) $x(t) = e^{j(2t+\frac{\pi}{4})}$
- (d) $x(t) = (\frac{1}{2})^n u[n]$
- (e) $x(t) = e^{j(\frac{\pi n}{2}+\frac{\pi}{8})}$

11. For each of the following determine the properties of the system – Linearity, time-invariance, Memory, Causality, and Invertibility.

a. $y(t) = 2t^2 x(t)$

b. $y(t) = 3e^{3x(t)}$

c. $y(t) = x(t) + tx(t-1)$

d. $y(t) = \sin[x(t)]$

e. $y[n] = x^2[n] - x[n-1]x[n+1]$