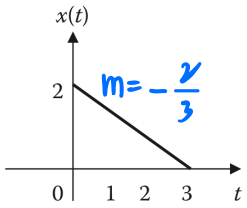
資訊114 H44091196 洪承恭

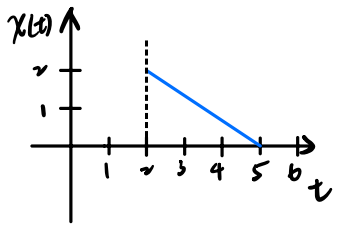
1.24 If $x(t)$ is the signal shown in Figure 1.58, sketch (a) $x(t-2)$, (b) $x(3t)$, and (c) $y(t) = 1 + 2x(t)$.



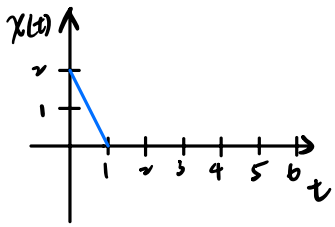
$$x(t)=\begin{cases}-\frac{2}{3}t+2, & 0<t<3\\ 0, & \text{otherwise}\end{cases}$$

FIGURE 1.58 For Problem 1.24.

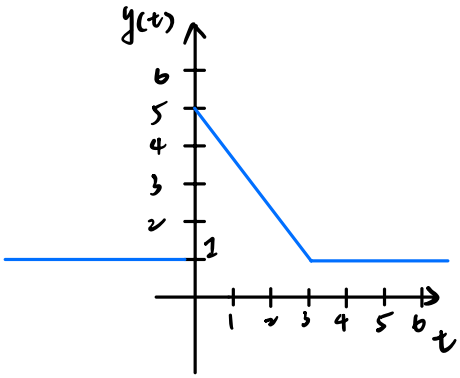
(a) 右移2



(b) t縮為$\frac{1}{3}$倍



(c) $y(t)=\begin{cases}-\frac{4}{3}t+5, & 0<t<3\\ 1, & \text{otherwise}\end{cases}$



1.29 Given $x(t)$ in Figure 1.59, sketch
(a) $y(t) = -x(t-1)$
(b) $z(t) = 4x(t/2)$
(c) $h(t) = x(2-t)$

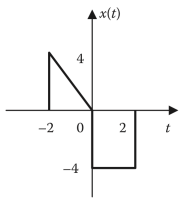


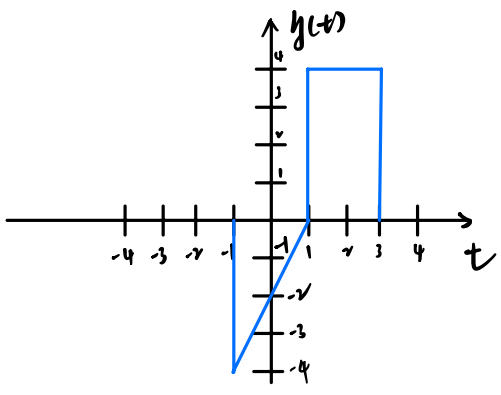
FIGURE 1.59 For Problem 1.29.

$$x(t)=\begin{cases}-4, & 0<t<2\\ -2t, & -2<t<0\end{cases}$$

(a)

$$x(t-1)=\begin{cases}-4, & 0<(t-1)<2\\ -2(t-1), & -2<(t-1)<0\end{cases}$$

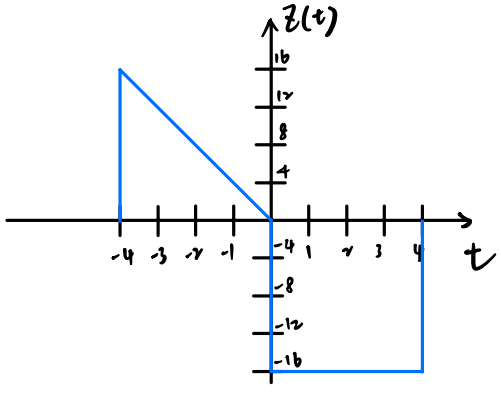
$$y(t)=-x(t-1)=\begin{cases}4, & 1<t<3\\ 2t-2, & -1<t<1\end{cases}$$



(b)

$$x\left(\frac{t}{2}\right)=\begin{cases}-4, & 0<\frac{t}{2}<2\\ -2\left(\frac{t}{2}\right), & -2<\frac{t}{2}<0\end{cases}$$

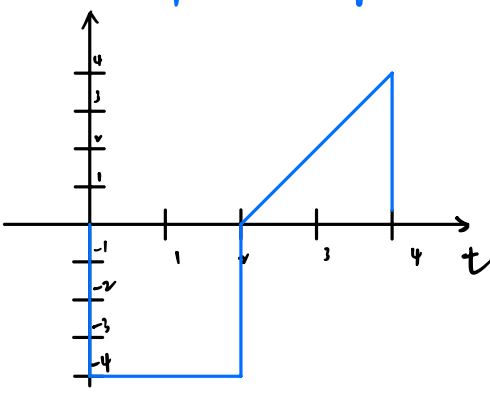
$$z(t)=4x\left(\frac{t}{2}\right)=\begin{cases}-16, & 0<t<4\\ -4t, & -4<t<0\end{cases}$$



(c)

$$h(t)=x(2-t)=\begin{cases}-4, & 0<(2-t)<2\\ -2(2-t), & -2<(2-t)<0\end{cases}$$

$$=\begin{cases}-4, & 0<t<2\\ 2t-4, & 2<t<4\end{cases}$$



1.32 Consider the discrete-time signal in Figure 1.62. Sketch the following signals:

(a) $x[n]u[2-n]$

(b) $x[n][u[n+1]-u[n]]$

(c) $x[n]\delta[n-2]$

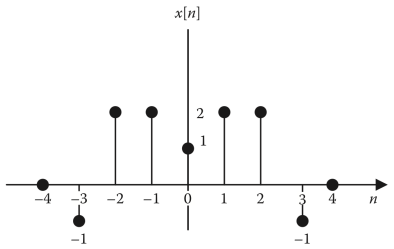
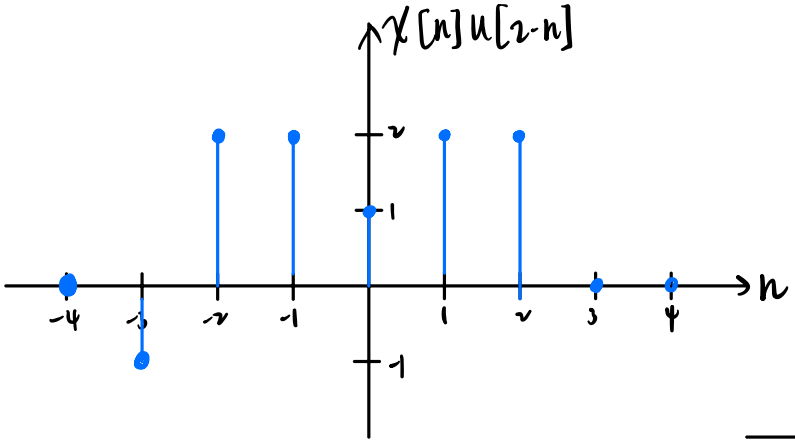


FIGURE 1.62 For Problem 1.32.

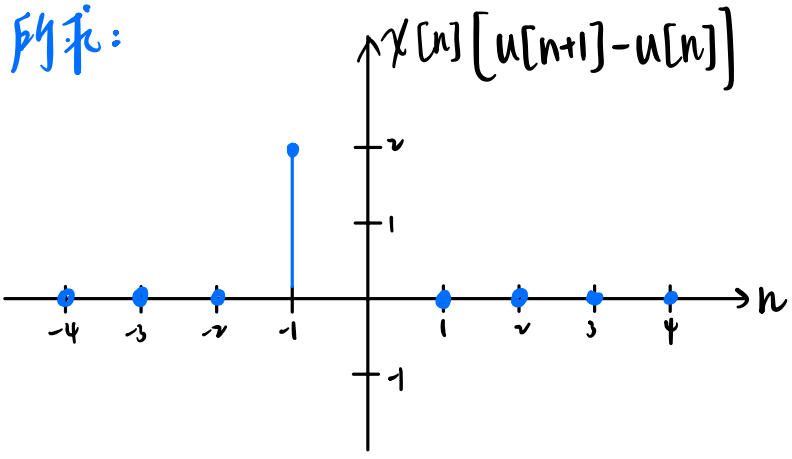
(a) $u[2-n]=\begin{cases}1, & 2-n\geq 0\\ 0, & 2-n<0\end{cases}=\begin{cases}1, & n\leq 2\\ 0, & n>2\end{cases}$

所求 $x[n]u[2-n]$:



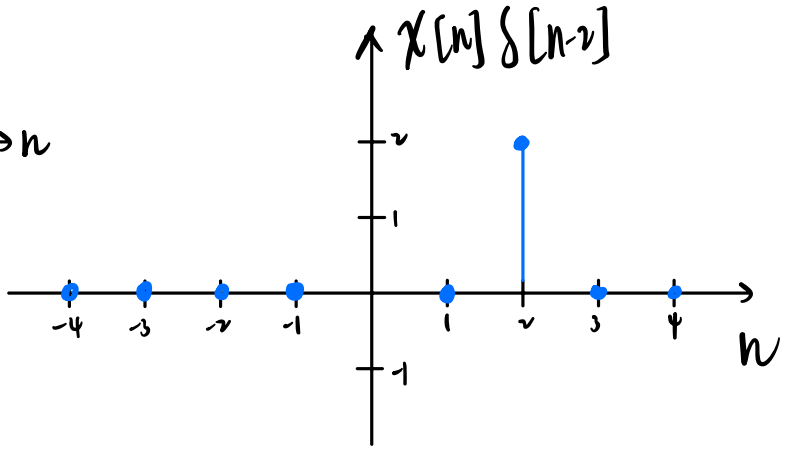
(b) $u[n+1]-u[n]=\begin{cases}1, & n=-1\\ 0, & \text{otherwise}\end{cases}$

所求:



(c) $\delta[n-2]=\begin{cases}1, & n=2\\ 0, & \text{otherwise}\end{cases}$

所求:



1.36 Determine which of the following systems is linear:

(a) $y(t) = \exp[x(t)]$

(b) $y(t) = \cos x(t)$

(c) $y(t) = t^2 x(t)$

$y = Tx$, $T\{k_1x_1 + k_2x_2\} = k_1y_1 + k_2y_2$

(a) $y(t) = \exp[k_1x_1(t) + k_2x_2(t)] = \exp[k_1x_1(t)] \cdot \exp[k_2x_2(t)]$

$\neq k_1y_1(t) + k_2y_2(t)$

↳ nonlinear

(b) $\cos[x_1(t) + x_2(t)] \neq \cos x_1(t) + \cos x_2(t)$

↳ nonlinear

(c) $y_1 = t^2x_1(t)$, $y_2 = t^2x_2(t)$

$k_1y_1 + k_2y_2 = t^2(k_1x_1(t) + k_2x_2(t))$ ⇒ 當 $y = k_1y_1 + k_2y_2$, $x = k_1x_1(t) + k_2x_2(t)$

↳ 滿足 $y = t^2x$, linear

1.39 Determine whether the following systems are causal or noncausal, memoryless or with memory.

(a) $y(t) = e^{x(t)}\sin t$

(b) $y(t) = \int_0^t x(\tau)\tau\, d\tau$

(a)

只和當下 t 有關 ⇒ causal

output 只和 current input 有關 ⇒ memoryless

(b) 沒用到未來的資料 ⇒ causal

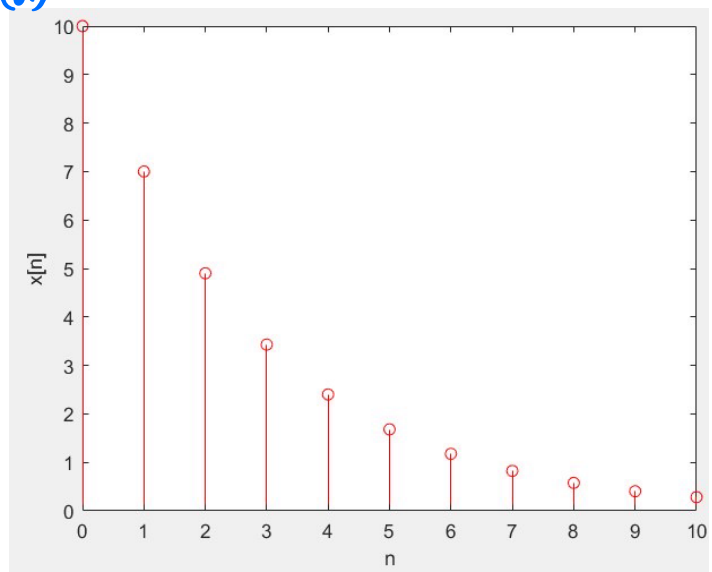
output 和 past input 有關 ⇒ memory

1.49 Use MATLAB to plot these discrete-time signals:

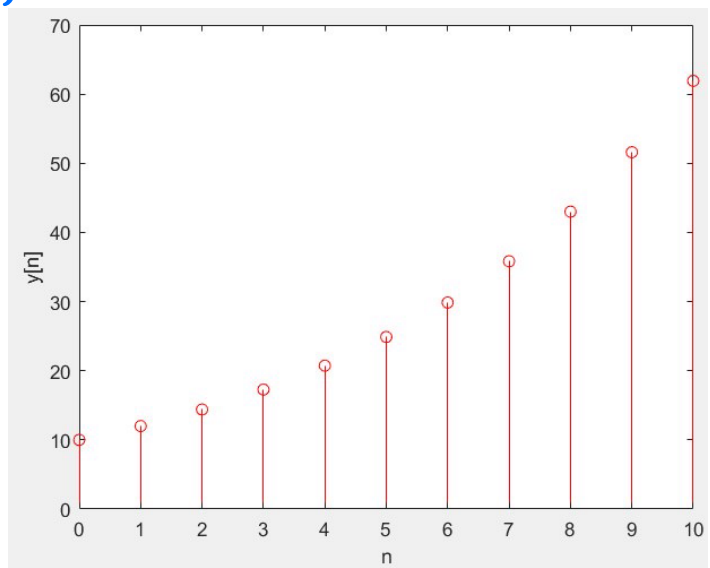
(a) $x[n] = 10(0.7)^n$, $n \geq 0$

(b) $y[n] = 10(1.2)^n$, $n \geq 0$

(a)



(b)



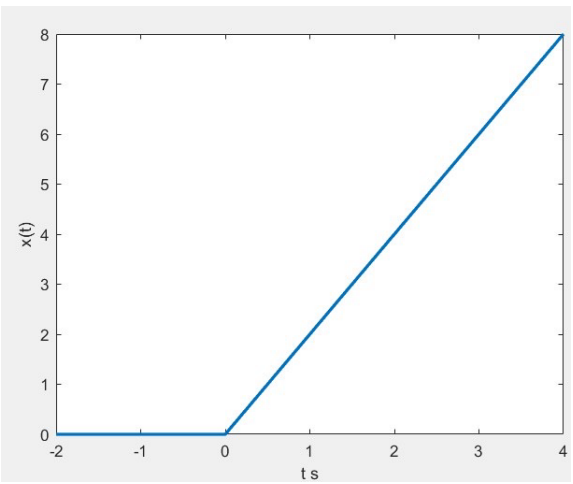
1.50 Use MATLAB to plot the following signals over $-2 \leq t \leq 4$ s:

(a) $x(t) = 2\,r(t)$

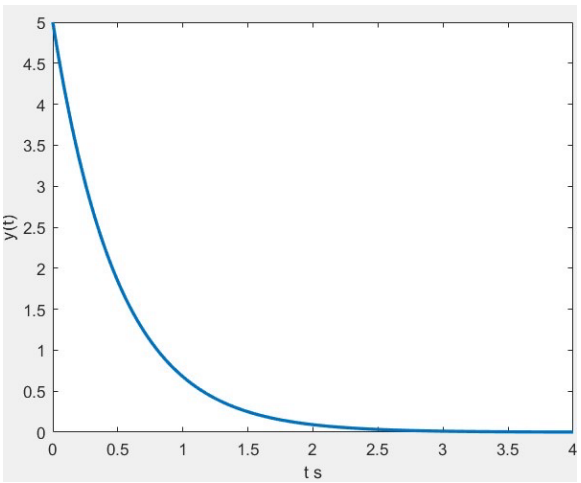
(b) $y(t) = 5e^{-2t}\,u(t)$

(c) $z(t) = 4\cos 4t + 2\sin(2t - \pi/4)$

(a)



(b)



(c)