2.4 Given the following signals

$$x(t) = 2\delta(t), \quad y(t) = 4u(t), \quad z(t) = e^{-2t}u(t),$$

Evaluate the following operations.

(a) $x(t)*y(t)$

(b) $x(t)*z(t)$

(c) $y(t)*z(t)$

(d) $y(t)*[y(t) + z(t)]$

2.14 The impulse response of a low-pass filter is $h(t) = e^{-t}u(t)$. Determine its step response, that is, the output when the input is a unit step.

2.24 Determine the overall impulse response for the system shown in Figure 2.34.

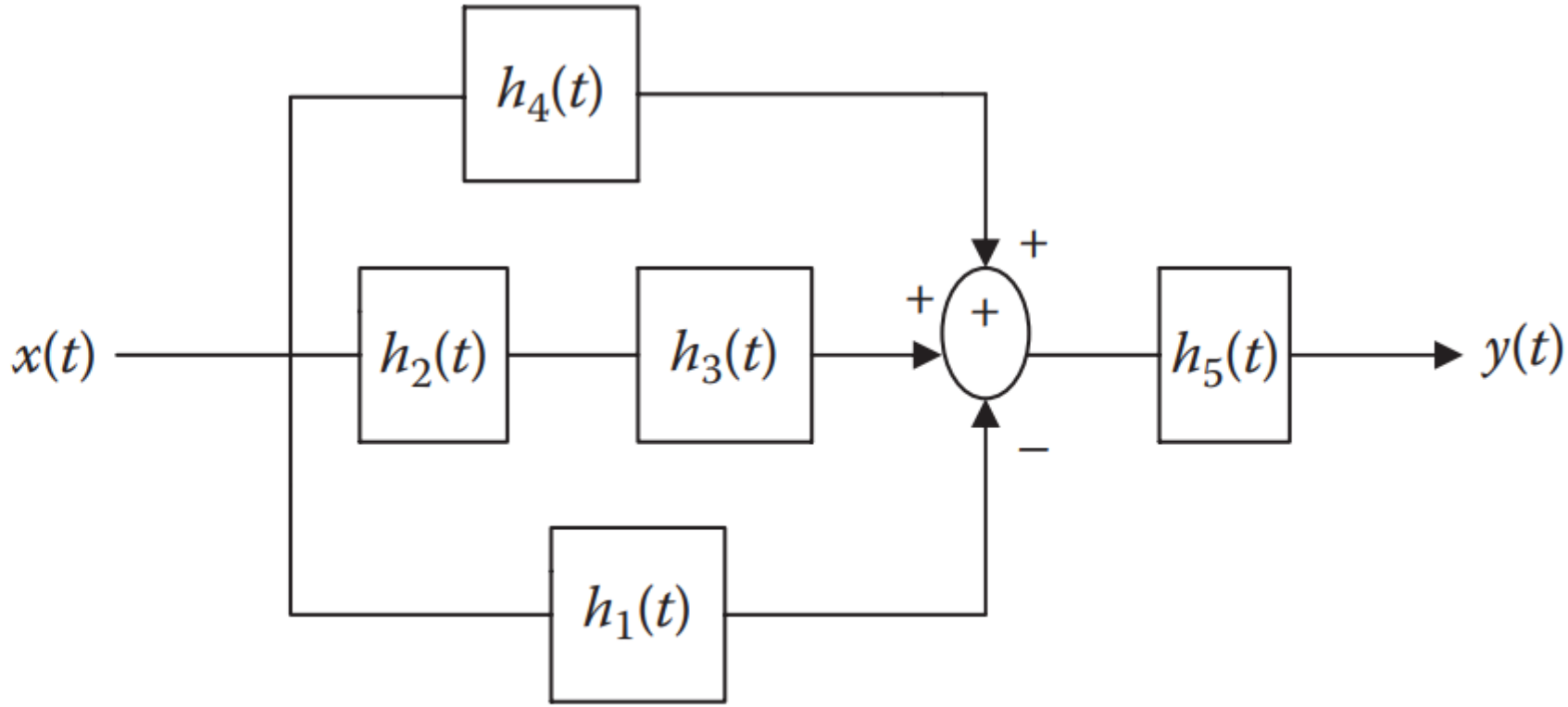

FIGURE 2.34 For Problem 2.24.

2.30 Given that $x[n] = \begin{cases} 1, & n = 0 \\ -1, & n = 1 \\ 0, & \text{otherwise} \end{cases}$, $h[n] = \begin{cases} 1, & n = 0 \\ 3, & n = 1 \\ 2, & n = 3 \\ 0, & \text{otherwise} \end{cases}$

(a) Sketch $x[n]$ and $h[n]$.

(b) Find $x[n]*h[n]$.

2.33 Two systems are described by

$$h_1[n] = (0.4)^n u[n], \qquad h_2[n] = \delta[n] + 0.5\delta[n-1]$$

Determine the response to the input $x[n] = (0.4)^n u[n]$ if
(a) The two systems are connected in parallel
(b) The two systems are connected in cascade

2.36 The input $x[n] = [1 \ -1]$ to a system produces the output $y[n] = [4 \ 2 \ 5 \ 1]$. Determine the impulse response.

2.39 An LTI discrete system has the impulse response $h[n] = (0.6)^n\, u[n]$. Use MATLAB to calculate the response of the system to input $x[n] = u[n]$ and plot it.

2.40 Repeat the previous problem for $x[n] = \cos(n\pi/6)u[n]$.

2.41 Given that $x[n] = [1\ -1\ 2\ 4]$ and $y[n] = [2\ 6\ 4\ 0\ 8\ 5\ 12]$, use MATLAB to find $h[n]$.

a. 以recursive algorithm 求h[n]

b. 手算或以deconv() 驗算