B06505047 陳銘杰 HW2

2.8 $y(t) = \int_{-\infty}^{\infty} x(\tau)h(t-\tau)d\tau$

$$= \int_{-\infty}^{\infty} x(\tau)\{\delta(t+2-\tau) + 2\delta(t+1-\tau)\}d\tau$$

$$= \int_{-\infty}^{\infty} x(\tau)\delta(t+2-\tau)d\tau + 2\int_{-\infty}^{\infty} x(\tau)\delta(t+1-\tau)d\tau$$

$$= x(t+2) + 2x(t+1)$$

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

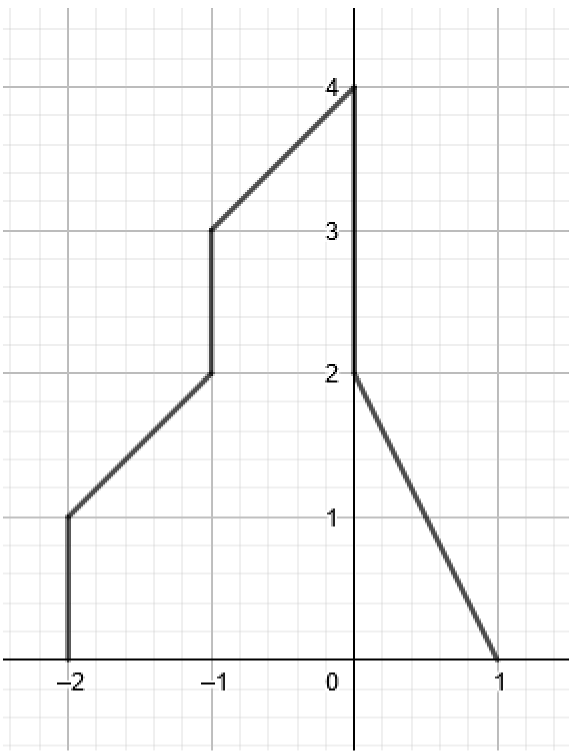
$$= \begin{cases} t+3, -2 \le t \le -1 \\ -t, -1 < t \le 0 \\ 0, elsewhere \end{cases}$$

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

$$= \begin{cases} t+2, -1 \le t \le 0 \\ 1-t, 0 < t \le 1 \\ 0, elsewhere \end{cases}$$

$$y(t) = \left[\begin{cases} t+3, -2 \le t \le -1 \\ -t, -1 < t \le 0 \\ 0, elsewhere \end{cases}\right] + 2\left[\begin{cases} t+2, -1 \le t \le 0 \\ 1-t, 0 < t \le 1 \\ 0, elsewhere \end{cases}\right]$$

$$= \begin{cases} t+3, -2 \le t \le -1 \\ t+4, -1 < t \le 0 \\ 2-2t, 0 < t \le 1 \\ 0, elsewhere \end{cases}$$



2.23 $\mathrm{y(t)} = \int_{-\infty}^{\infty} x(\tau)h(t-\tau)d\tau$

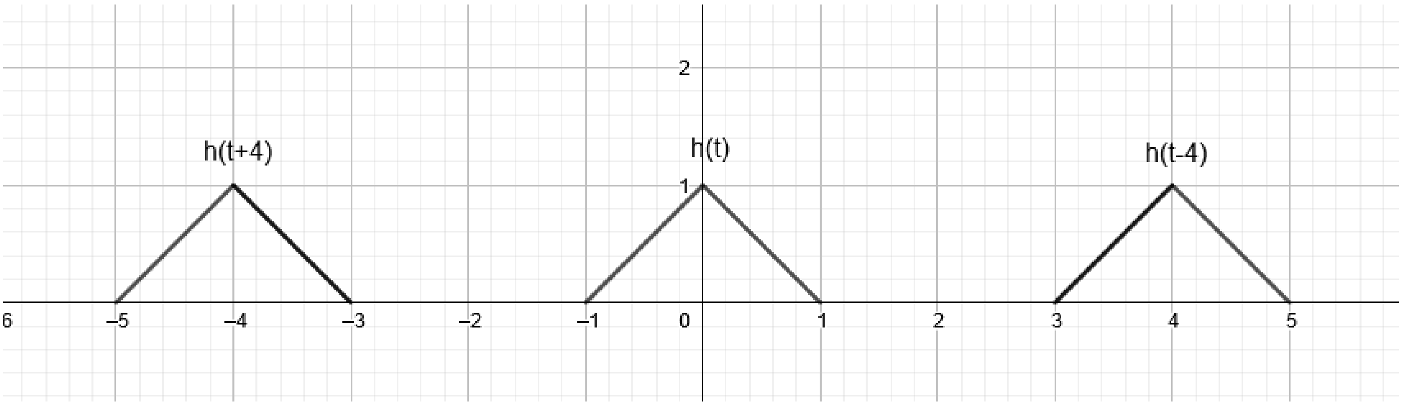
$$= \int_{-\infty}^{\infty} \sum_{k=-\infty}^{\infty} \delta(\tau - kT)h(t-\tau)d\tau$$

$$= \sum_{k=-\infty}^{\infty} \int_{-\infty}^{\infty} \delta(\tau - kT)h(t-\tau)d\tau$$

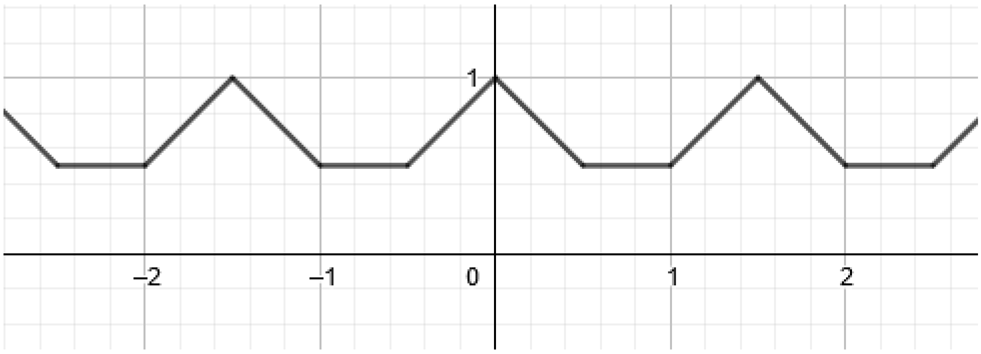
$$= \sum_{k=-\infty}^{\infty} \{\delta(t - kT) * h(t)\}$$

$$= \sum_{k=-\infty}^{\infty} h(t - kT)$$

2.23a $\mathrm{y(t)} = \sum_{k=-\infty}^{\infty} h(t - 4k)$



2.23c $\mathrm{y(t)} = \sum_{k=-\infty}^{\infty} h(t - 3k/2)$



2.39a

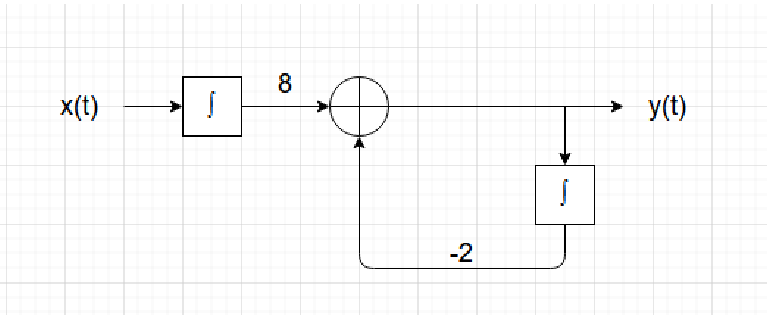
$$y(t) = -\frac{1}{2}\frac{dy(t)}{dt} + 4x(t)$$

$$\frac{dy(t)}{dt} = -2y(t) + 8x(t)$$

$$dy(t) = -2y(t)dt + 8x(t)dt$$

$$\int dy(t) = -2\int y(\tau)d\tau + 8\int x(\tau)d\tau$$

$$y(t) = -2\int y(\tau)d\tau + 8\int x(\tau)d\tau$$



2.39b

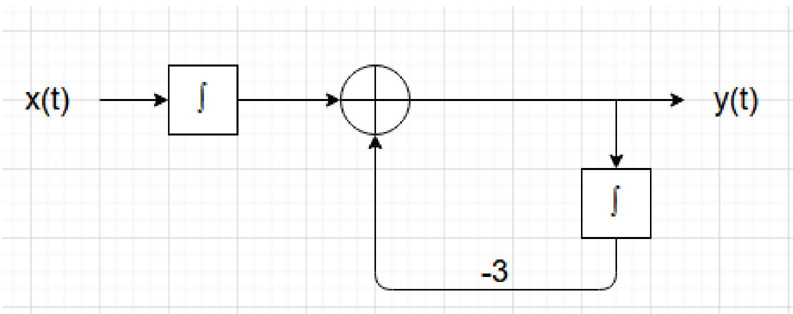
$$\frac{dy(t)}{dt} + 3y(t) = x(t)$$

$$\frac{dy(t)}{dt} = -3y(t) + x(t)$$

$$dy(t) = -3y(t)dt + x(t)dt$$

$$\int dy(t) = -3\int y(\tau)d\tau + \int x(\tau)d\tau$$

$$y(t) = -3\int y(\tau)d\tau + \int x(\tau)d\tau$$



2.51a

假設 input $x[n]=\delta[n]$，在第一種串聯方法裡 output

$y[n]=n(\frac{1}{2})^n u[n]$，但在第二種裡，先經過 B 的 output 為

$h[n]=n\delta[n]=0$，所以$y[n]=0$，commutativity property 沒有起作用。

2.51b

假設 input $x[n]=\delta[n]$，在第一種串聯方法裡 output

$y[n]=(\frac{1}{2})^n u[n]+2$，在第二種裡，先經過 B 的 output 為

$h[n]=\delta[n]+2$，最後 output $y[n]=(\frac{1}{2})^n u[n]+4$，兩種串聯方法的 output 不同，commutativity property 沒有起作用