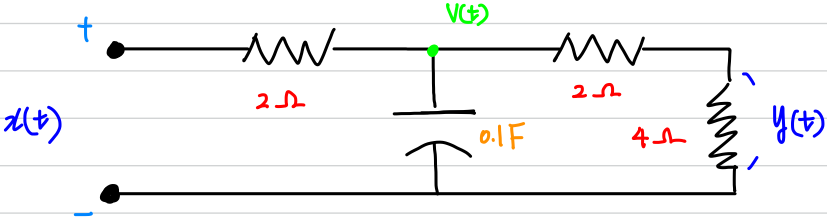
Chap. 2 2018142226 이 승 원

2.15




$$\frac{x(t)-V(t)}{2} = C\frac{dV(t)}{dt} + \frac{V(t)-y(t)}{2}$$

$$\frac{V(t)-y(t)}{2} = \frac{y(t)}{4}$$

대입

$$V(t) - y(t) = \frac{y(t)}{2} \rightsquigarrow V(t) = \frac{3\,y(t)}{2}$$

$$\frac{x(t) - \frac{3}{2}y(t)}{2} = 0.1 \cdot \frac{3}{2}y'(t) + \frac{y(t)}{4}$$

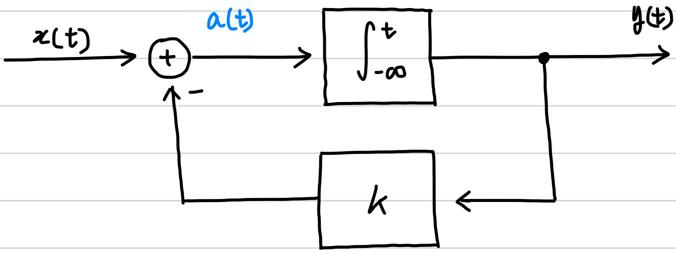
$$2x(t) - 3y(t) = 0.6\,y'(t) + y(t)$$

$$2x(t) = 0.6\,y'(t) + 4y(t)$$

$$\langle \quad x(t) = 0.3\,y'(t) + 2y(t) \quad \rangle$$

2 / 6

(a)

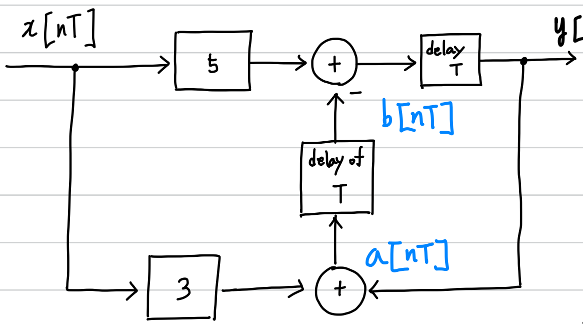



$$a(t) = x(t) - k\,y(t)$$

$$y(t) = \int_{-\infty}^{t} a(t)\,dt$$

$$\therefore\ y(t) = \int_{-\infty}^{t} x(t)\,dt - k\int_{-\infty}^{t} y(t)\,dt$$

(b)



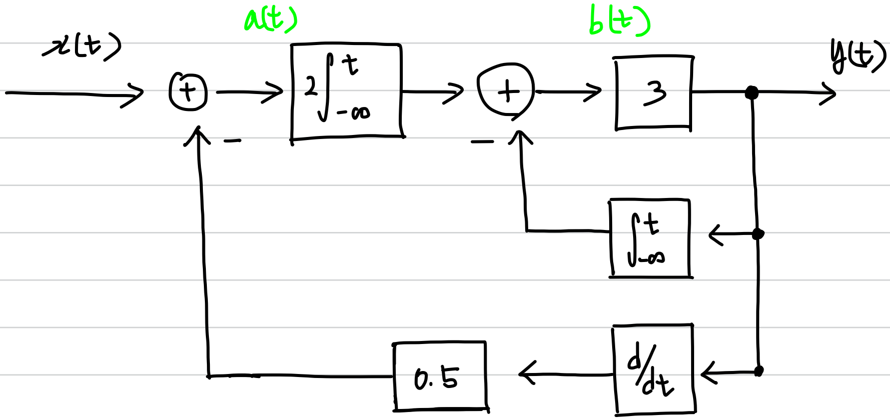

$$y[nT] = 5x[(n-1)T] - b[(n-1)T]$$

$$b[nT] = a[(n-1)T]$$

$$3x[nT] + y[nT] = a[nT]$$

$$\therefore\ y[nT] = 5x[(n-1)T] - 3x[(n-2)T] - y[(n-2)T]$$

(c)




$$x(t) - 0.5 \cdot \frac{d}{dt} y(t) = a(t)$$

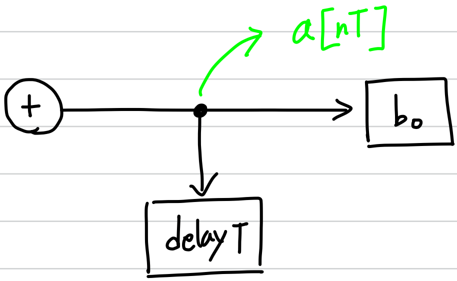
$$2\int_{-\infty}^{t} a(t)\,dt - \int_{-\infty}^{t} y(t)\,dt = b(t)$$

$$3\,b(t) = y(t)$$

$$2\int_{-\infty}^{t} x(t)\,dt - y(t) + y(-\infty) - \int_{-\infty}^{t} y(t)\,dt = \frac{1}{3} y(t)$$

$$\therefore 6\int_{-\infty}^{t} x(t)\,dt - 3\,y(t) + 3y(-\infty) - \int_{-\infty}^{t} y(t)\,dt = y(t)$$

(d)




$$a[nT] = x[nT] + a[(n-1)T] \cdot a_1 + a[(n-2)T] \cdot a_2$$

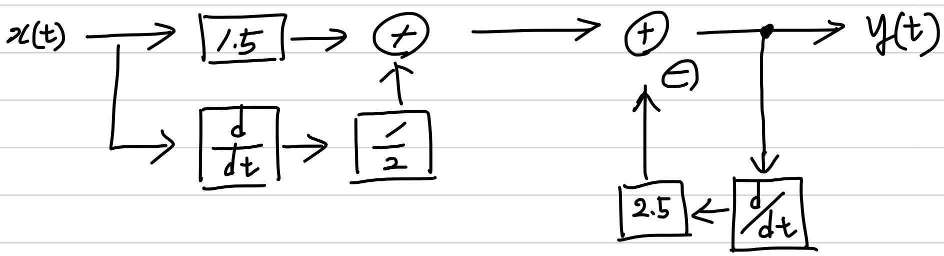
$$y[nT] = b_0 \cdot a[nT] + b_1 \cdot a[(n-1)T] + b_2 \cdot a[(n-2)T]$$

$$y[nT] = b_0 \cdot x[nT] + b_0 \cdot a[(n-1)T] \cdot a_1 + b_0 \cdot a[(n-2)T] \cdot a_2$$

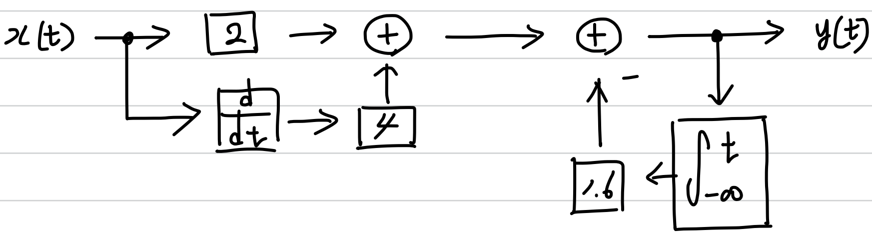
$$+ b_1 \cdot a[(n-1)T] + b_2 \cdot a[(n-2)T]$$

2.17

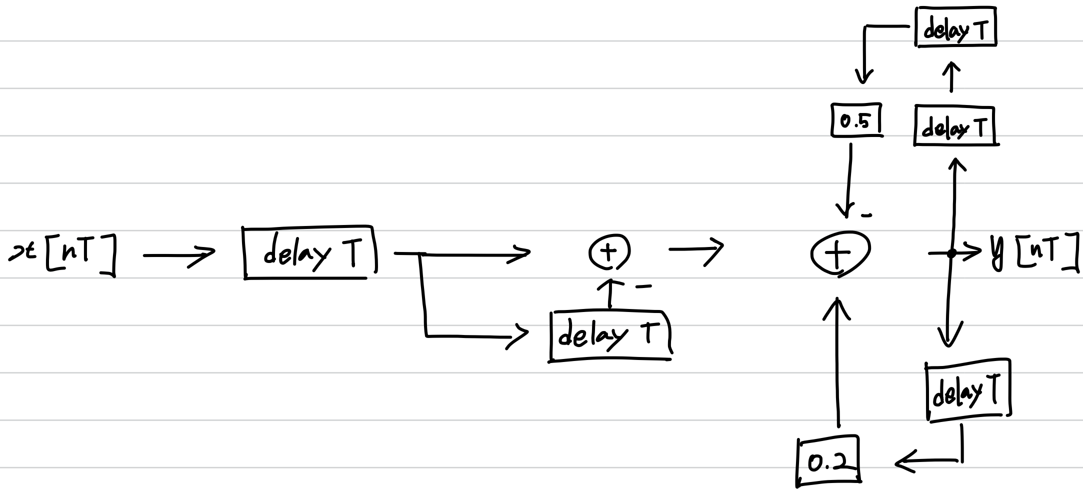
(a) $y(t) = \frac{1}{2}\frac{dx}{dt} + 1.5x(t) - 2.5\frac{dy}{dt}$




(b)
$y(t) = 2x(t) + 4\frac{dx(t)}{dt} - 1.6\int_{-\infty}^{t} y(\tau)d\tau$

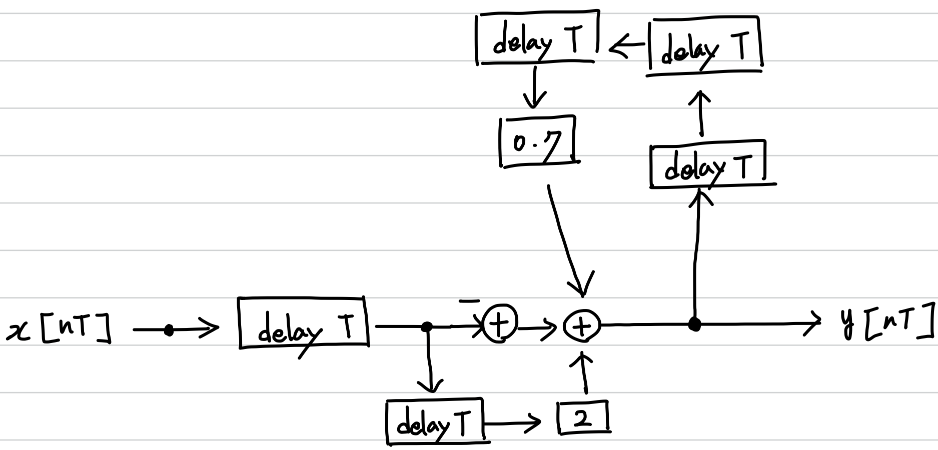


(c) $y[nT] = 0.2y[(n-1)T] - 0.5y[(n-2)T] + x[(n-1)T] - x[(n-2)T]$



(d)

$$y[nT] = 0.7y[(n-3)T] - x[(n-1)T] + 2x[(n-2)T]$$



2.19

a. memory , 1st order

b. memory , 2nd order

c. Non memory

d. memory , 1st order

e. memory , 1st order

f. memory , 2nd order

2.21

(a) Time - invariant , 모든 항의 계수가 상수 계수

(b) Time - Varying , $4t\,x(t)$ 때문에

(c) Time - invariant , 모든 항의 계수가 상수 계수

(d) Time - invariant , 모든 항의 계수가 상수 계수

(e) Time - invariant , 모든 항의 계수가 상수 계수

(f) Time - Varying , $-\dfrac{y[(n-2)T]}{n}$ 때문에

2.22

(a)

$x_1(t) \longrightarrow y_1(t)$ , $x_2(t) \rightarrow y_2(t)$

$$y_1(t) = \int_{-\infty}^{t} x_1^2(\tau)\, h(t-\tau)\, dt$$

$$y_2(t) = \int_{-\infty}^{t} x_2^2(\tau)\, h(t-\tau)\, dt$$

$$\int_{-\infty}^{t} \{Ax_1(\tau) + Bx_2(\tau)\}^2 \cdot h(t-\tau)\, dt \neq Ay_1 + By_2$$

$\therefore$ not linear system

(b)

$$x[nT] = x_1[nT] \longrightarrow y_1[nT]$$

$$x[nT] = x_2[nT] \longrightarrow y_2[nT]$$

$$y_1[nT] = 0.5\{x_1[nT] + x_1[(n-1)T] + x_1[(n-2)T]\}$$

$$y_2[nT] = 0.5\{x_2[nT] + x_2[(n-1)T] + x_2[(n-2)T]\}$$

$$x[nT] = Ax_1[nT] + Bx_2[nT]$$

$$y[nT] = 0.5\{Ax_1[nT] + Bx_2[nT] + Ax_1[(n-1)T] + Bx_2[(n-1)T] + Ax_1[(n-2)T] + Bx_2[(n-2)T]\}$$

$$= Ay_1[nT] + By_2[nT]$$

$\therefore$ linear system

(c)

$$x(t) = x_1(t) \longrightarrow y_1(t)$$

$$x(t) = x_2(t) \longrightarrow y_2(t)$$

$$y_1(t) = x_1(t+3) + 2\int_{-\infty}^{0.5t} x_1(\tau)\,d\tau$$

$$y_2(t) = x_2(t+3) + 2\int_{-\infty}^{0.5t} x_2(\tau)\,d\tau$$

$$x(t) = Ax_1(t) + Bx_2(t)$$

$$y(t) = Ax_1(t+3) + Bx_2(t-3) + 2\int_{-\infty}^{0.5t} Ax_1(\tau)\,d\tau + 2\int_{-\infty}^{0.5} Bx_2(\tau)\,d\tau$$

$$= Ay_1(t) + By_2(t)$$

$\therefore$ linear system

(d)

$$y_1[nT] = \frac{2x_1[(n-1)T] - x_1[(n+1)T]}{1 + x_1[(n-2)T]}$$

$$y_2[nT] = \frac{2x_2[(n-1)T] - x_2[(n+1)T]}{1 + x_2[(n-2)T]}$$

$$y_o[nT] = \frac{2Ax_1[(n-1)T] + 2Bx_1[(n-1)T] - Ax_1[(n+1)T] - Bx_2[(n+1)T]}{1 + Ax_1[(n-2)T] + Bx_2[(n-2)T]}$$

$$\neq Ay_1[nT] + By_2[nT]$$

$\therefore$ not linear system

2.23

(a) Causal system

현재 값과 이전 값만 입력받음.

(b) Causal system

현재 값과 이전 값만 입력받음.

(c) not causal system

미래의 값이 input으로 들어옴.

(d) not causal system

미래의 값이 input으로 들어옴