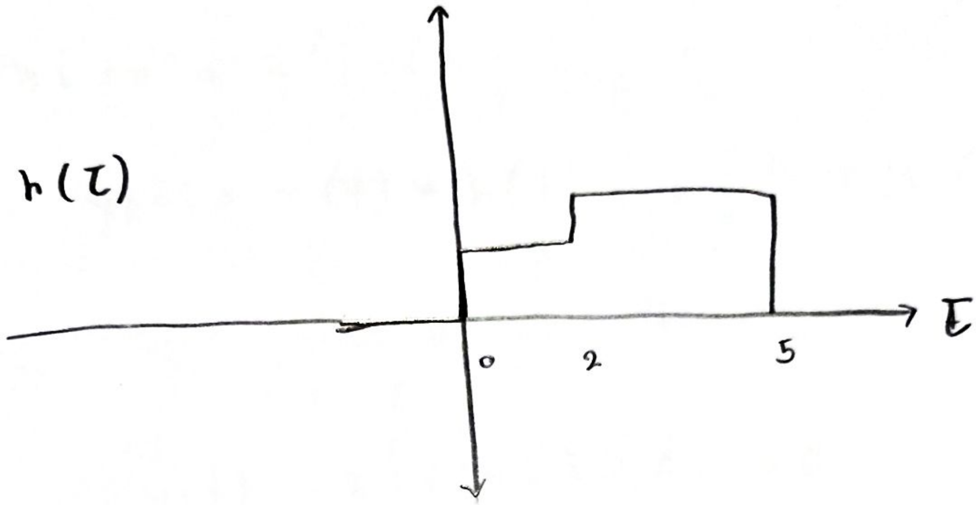
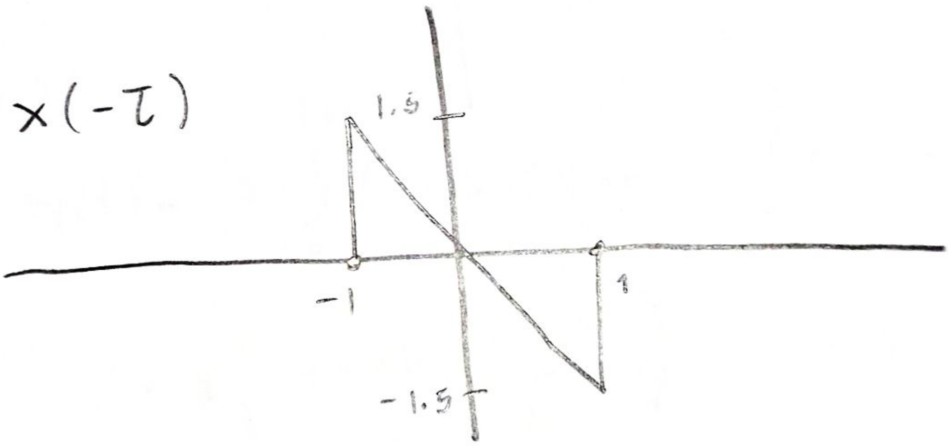
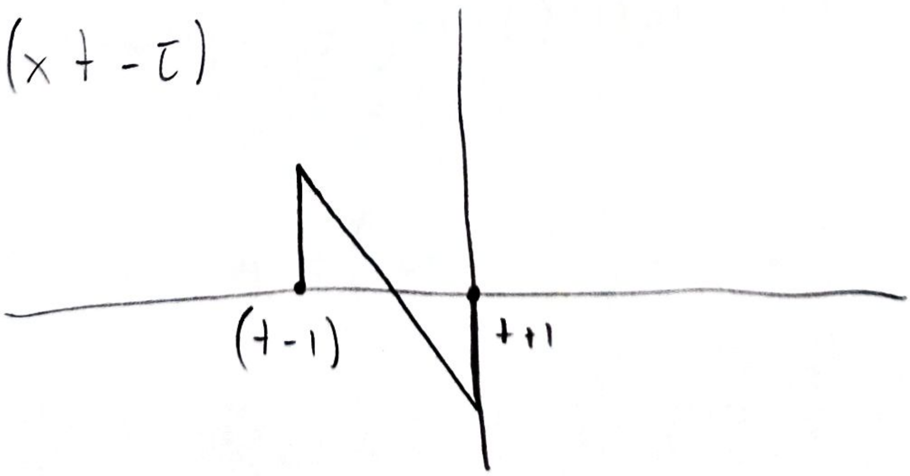
นาย พฤกษ์ แหล่งวิทยา ๖๘๑๐๒๐๓493

①

Sol^n







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ข้อ ①

$$y(t) = x(t) * h(t) = \int_0^5 (x\tau)h(t-\tau)d\tau$$

$$x(\tau) = m\tau + b = 2(\tau - 1)$$

$$y(t) = x(t) * h(t) = 2\int_0^5 (\tau-1)u(\tau-t)d\tau$$

$t < -1$

$$y(t) = 2\int_0^5 (\tau-1)(0)\,d\tau = 0$$

$-1 \le t \le 1$

$$y(t) = 2\int_0^{t+1} (\tau-1)(1)\,d\tau + 2\int_{t+1}^5 (\tau-1)(0)\,d\tau$$

$$= 2\left((t+1) - \frac{(t+1)^2}{5}\right) = -0.4(t^2+1)$$

$1 \le t \le 2$

$$y(t) = 2\int_0^5 (\tau-1)(1)\,d\tau = 2\tau - 2\frac{\tau^2}{5}\Big|_0^5$$

$$= 2\left(2 - \frac{25}{5}\right) = -6$$

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① ต่อ

$2 \leq t < 4$

$$y(t) = 2\int_{0}^{5}(1-\tau)(2)\,d\tau + 2\int_{t-2}^{5}(1-\tau)(1)\,d\tau$$

$$= 4\tau - 2\tau^2\Big|_{0}^{t-2} + 2\tau - 2\frac{\tau^2}{5}\Big|_{t-2}^{5}$$

$$= 0.4t^2 + 3t - 6$$

$4 \leq t < 6$

$$y(t) = 2\int_{t-4}^{5}(1-\tau)(2)\,d\tau = 4\tau - \frac{4\tau^2}{2}\Big|_{t-4}^{5}$$

$$= 4(5) - 2(4) - 2(t-4) + 2(t-4)^2$$

$$= 20 - 8 - 2t + 8 + 2t^2 - 8t + 8$$

$$= 2t^2 - 10t + 12$$

$t \geq 6$, $y(t) = 0$

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(2) $x[n] = 5\{1 - \cos[\pi n/50 - \pi/3]\}\sin[2\pi n/10]$

$= 5\sin[2\pi n/10] - 5\cos[\pi n/50 - \pi/3]\sin[2\pi n/10]$

$= 5\sin[2\pi n/10] - 2.5\cos[12\pi n/50 - \pi/3]$

$- 2.5[8\pi n/50 - \pi/3]$

$= 2.5e^{j2\pi n/10} + 2.5^{-j2\pi n/10} - (1.25e^{j\pi/3})e^{j12\pi n/50}$

$+ (1.25^{-j\pi/3})e^{-j12\pi n/50} - (1.25e^{-j\pi/3})e^{j8\pi n/50}$

$+ (1.25e^{j\pi/3})e^{-j8\pi n/50}$

$\Omega_0 = \frac{\pi}{50} \rightarrow N = 50$

$x[n] = \sum_{k=-25}^{24} x[k]e^{jk\Omega_0 n} = \sum_{n=-25}^{24} x[k]e^{j\pi n/50}$

$x[10] = 2.5$, $x[-16] = 2.5$ #

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(3) $x[k] = 1 + \cos\left[\frac{\pi}{5}k\right] - 2\sin\left[\frac{7\pi}{35}k\right]$

$\Omega_0 = \frac{\pi}{5} \rightarrow N = 5, (m = 2)$ ค่าของช่วง

$k = 0, \cdots, 4$

$$X[k] = \frac{1}{5}\sum_{n=0}^{4} x[n]e^{-j\pi kn/5} = 1 + \cos\left[\frac{\pi}{5}k\right] - 2\sin\left[\frac{2}{35}k\right]$$

$$= \left(-\frac{1}{j^2}\right)e^{j\frac{\pi k}{5}} + \left(-\frac{1}{j^2}\right)e^{-j\frac{\pi k}{5}}$$

$$+ \left(\frac{1}{2}\right)e^{j\frac{7\pi k}{35}} + \left(-\frac{1}{2}\right)e^{-j\frac{7\pi k}{35}}$$

$\frac{1}{5}x[1] = -\frac{1}{2j}$, $\frac{1}{5}x[2] = \frac{1}{2}$ #

$x[1] = -\frac{5}{2j}$, $x[2] = \frac{5}{2} = 2.5$

$\frac{1}{5}x[3] = \frac{1}{2j}$, $\frac{1}{5}x[4] = -\frac{1}{2}$ #

$x[3] = \frac{5}{2j}$ $x[4] = -2.5$

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④ จากรูป ได้ค่าคาบเท่ากับ $N = 9$

$$x[n] = x[-4] = 0 \;,\; x[-3] = 3 \;,\; x[-2] = 2$$
$$,\; x[-1] = -4 \;,\; x[0] = 1 \;,$$
$$x[4] = 0 \;,\; x[3] = 3 \;,\; x[2] = -2$$
$$,\; x[1] = 4$$

$$\Omega_0 = \frac{2\pi}{9}$$

$$x[k] = \frac{1}{N} \sum_{n=-4}^{4} x[n]\, e^{-jk\,2\pi n/9}$$

$$= \frac{1}{9}\left\{ 3e^{j6\pi k} + 3^{-j6\pi k} + 2e^{j4\pi k} - 2e^{-j4\pi k} \right.$$
$$\left. - 4e^{j2\pi k} + 4e^{-j2\pi k} + 1 \right\}$$

$$x[k] = \frac{1}{j9}\left\{ 6\cos(6\pi k) + 4\sin(4\pi k) + 8\sin(2\pi k) + 1 \right\}$$

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