1)

a) $h(t) = (\frac{1}{5})^n u[n]$

$\sum_{-\infty}^{\infty} (\frac{1}{5})^n u[n] \Rightarrow \sum_{0}^{\infty} (\frac{1}{5})^n = \frac{5}{4}$ علی و پایدار است

b) $h(t) = (\frac{1}{2})^n u(-n)$ علی و ناپایدار

c) $h(t) = n(\frac{1}{2})^n u(n-1)$ غیر علی و پایدار

d) $h(t) = 5^n u(d-n)$ غیر علی و ناپایدار

e) $h(t) = e^{2t} u(-1-t)$ غیر علی و پایدار

f) $h(t) = e^{-4t} u(t-2)$ علی و پایدار

g) $h(t) = e^{-2t} u(t+5)$ غیر علی و پایدار

h) $h(t) = te^{-t} u(t)$ علی و پایدار

i) $h(t) = e^{-(1-2j)t} u(t)$ علی و ناپایدار

٢) $y[n] = \frac{1}{2} y[n-1] + x[n]$

3   $y[0] = \frac{1}{2} y[-1] + x[0] = k$ $y(-1) = 0$

$y[1] = \frac{1}{2} y[0] + x[1] = \frac{1}{2} k$ $x(n) = k \delta(t)$

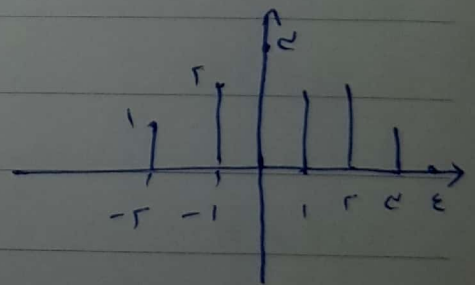6 $\vdots$ $\vdots$ $x(n) = \delta(t)$

                                                        $k = 1$

$y[n] = (\frac{1}{2})^{n} \cdot u(n)$

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٣) $y[n] = -2 y[n-1] + x[n] + 2 x[n-1]$

12   $y[n] = 0$ $n < -2$

15 $y[0] = 0$ $y[-1] = \delta$ $y[-2] = 1$

$y[\delta] = -110$ $y[n] = -110 \cdot (-2)^{n-\delta}$ $n > \delta$

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٢)

$$y(t) = \int_{-\infty}^{\infty} x(z)\,h(t-z)\,dz = \int_{0}^{\tau} h(t-z)\,dz - \int_{\tau}^{d} (t-z)\,dz$$

$$y(t) = \int_{0}^{\tau} e^{\tau(t-z)}\,dz - \int_{\tau}^{d} e^{\tau(t-z)}\,dz \qquad\qquad t\le 1$$

$$\int_{t-1}^{\tau} e^{\tau(t-z)}\,dz - \int_{\tau}^{d} e^{\tau(t-z)}\,dz \qquad\qquad 1\le t\le 2$$

$$\int_{t-1}^{0} -e^{\tau(t-z)}\,dz \qquad\qquad 2\le t\le 4$$

$$\qquad\qquad 4\le t$$

$$\frac{1}{\tau}\left[e^{\tau t} - \tau e^{\tau(t-\tau)} + e^{\tau(t-d)}\right] \qquad\qquad t\le 1$$

$$\frac{1}{\tau}\left[e^{\tau} + e^{\tau(t-d)} - \tau e^{\tau(t-\tau)}\right] \qquad\qquad 1\le t\le 2$$

$$\frac{1}{\tau}\left(e^{\tau(t-d)} - e^{\tau}\right) \qquad\qquad 2\le t\le 4$$

$$0 \qquad\qquad t>4$$

٢٢)

c) $y(t) = \int_0^r \sin(\pi t) \, h(t-z) \, dz$

$$y(t) = \begin{cases} 0 & t < 1 \\ (\frac{r}{\pi})(1-\cos(\pi(t-1))) & 1 < t < ٢ \\ (\frac{r}{\pi})(\cos(\pi(t-٢)-1)) & ٢ < t < ٥ \\ 0 & ٥ < t \end{cases}$$

$h(t) = h_1(t) - \frac{1}{r}\delta(t-1) \Rightarrow \begin{cases} \frac{\varepsilon}{r} & 1 \leq t \leq ٥ \\ 0 & else \end{cases}$

$y(t) = h(t) * n(t) = [h(t) * n(t)] - \frac{1}{r} n(t-٥)$

$h(t) * n(t) = \int_{t-٢}^{t} \frac{\varepsilon}{r} (at+b) \, dz \, (\frac{1}{٢} a t^r - \frac{1}{r} a(t-1)^٥$

$+ bt - b(t-1)$

$y(t) = \frac{\varepsilon}{r} (\frac{1}{٢} a t^r - \frac{1}{r} a(t-1)^٥ + bt - b(t-1)] -$

$\frac{1}{r} (a(t-٥)+b) = a t + b = n(t)$

٢٤)

$h_{r}[n] * h_{r}[n] = \delta[n] + \Gamma \delta[n-1] + \delta[n-r]$

$h[n] = h_1[n] * h_r[n] * h_r[n]$

$h[n] = h_1[n] + \Gamma h_1[n-1] + h_1[n-r]$ $h[0] = h_1[-] => h_1[-] = 1$

$h[1] = h_1[1] + \Gamma h[0] => h_1[1] = r$

$h[\Gamma] = h_1[\Gamma] + \Gamma h_1[1] + h_1[0] = h_r[\Gamma] = r$

$h[r] = h_1[r] + \Gamma h_1[\Gamma] + h_1[1] = h[r] = r$

$h[\xi] = h_1[\xi] + \Gamma h_1[r] + h_1[\Gamma] = h[\xi] = 1$

$h[\delta] = h_1[\delta] + \Gamma h_1[\xi] + h_1[r] = h[\delta] = 0$

$h_1[n] = 0$ $n < 0$, $n > \delta$

٢٠

(الف) $y(t) = \int_{\infty}^{t} e^{-(t-z)} x(z-\Gamma) dz = \int_{-\infty}^{t-z} e^{-(t-z-z')} x(z')dz'$

$h(t) = e^{-(t-\Gamma)} u(t-\Gamma)$

(ب) $y(t) = \int_{-\infty}^{\infty} h(z) x(t-z) dz = \int_{-\infty}^{\infty} e^{-(z-\Gamma)} [u(t-z+1)$

$- u(t-z-\Gamma)] dz$

$y(t) = \int_{\Gamma}^{t+1} e^{-(z-\Gamma)} dz = 1 - e^{-(t-1)}$ $t < 1$ الخطأ

$\int_{t-\Gamma}^{t+1} e^{-(z-\Gamma)} dz = e^{-(z-\Gamma)}[1-e^{-\Gamma}]$ $1 < t < \Gamma$

0    $\Gamma < t$

ﺏ٤)

$1 + \frac{0}{\epsilon} 2^{-1} + \frac{1}{q} 2^{-\Gamma} = 0$

$2 = -\frac{1}{\Gamma} \qquad 2 = -\frac{1}{\xi}$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad y(\circ) = 1$

$y(n) = A\left(-\frac{1}{\Gamma}\right)^n + B\left(-\frac{1}{\xi}\right)^n \qquad\qquad y(-1) = \Upsilon$

$A = -1$

$B = \Gamma \qquad\qquad\qquad y[n] = -\left(-\frac{1}{\Gamma}\right)^n - \Gamma\left(-\frac{1}{\xi}\right)^n$

$2^{\Gamma} - \Gamma 2 + 1 = 0$

$y[n] = A(1)^n + Bn(1)^n = A + Bn$

$y[n] = 1 - n \implies A = 1 \qquad B = -1$

$y[n] = A\left[\frac{1}{\Gamma\sqrt{\Gamma}}(1+j)\right]^n + B\left[\frac{1}{\Gamma\sqrt{\Gamma}}(1-j)\right]^n$

$B = \frac{-j}{\Gamma\sqrt{\Gamma}} \qquad\qquad A = \frac{j}{\Gamma\sqrt{\Gamma}}$