حسین نظامی - ۹۳۱۲۳۳ - تمرین سری سوم سیگنال و سیستم

۲) $h[n] = 3^n u[-n+2] \qquad x[n] = \left(\frac{1}{2}\right)^{n-1}\left(u[n]-u[n-10]\right)$

$$y[n] = \sum_{m=-\infty}^{\infty} \left(\frac{1}{2}\right)^{n-m-1}\left(u[n-m]-u[n-m-10]\right)3^m u[-m+2]$$

$$= \left(\frac{1}{2}\right)^{n-1}\sum_{m=-\infty}^{\infty} 3^m\left(u[n-m]-u[n-m-10]\right)2^m u[-m+2] = \left(\frac{1}{2}\right)^{n-1}\sum_{m=-\infty}^{2} 6^m\left(u[n-m]-u[n-m-10]\right)$$

۳) $h(t) = e^{t+1}\left(u(t)-u(t-5)\right) \qquad x(t) = 3e^{t-1}u(-t)$

$$y(t) = \int_{-\infty}^{\infty} e^{\lambda+1}\left(u(\lambda)-u(\lambda-5)\right)3e^{-1-\lambda-t}\,u(-t+\lambda)\,d\lambda$$

$$= 3e^{t}\underbrace{\int_{-\infty}^{\infty} u(\lambda-t)\,d\lambda}_{①} - \underbrace{\int_{-\infty}^{\infty} u(\lambda-5)u(\lambda-t)\,d\lambda}_{②}$$

$① : \int_t^{\infty} d\lambda = \infty - t = \infty$, $②$: if $t \leq 5$: $\int_5^{\infty} d\lambda = \infty - 5$, if $t > 5$: $\int_t^{\infty} d\lambda = \infty - t$

۱) $h[n] = 2\delta[n+1] - \delta[n-2] \qquad x[n] = \delta[n] + 2\delta[n+1]$

$$x[n+1] * h[n-1] = \left(\delta[n+1] + 2\delta[n+2]\right) * \left(2\delta[n] - \delta[n-3]\right)$$