EE362 Spring 2019

Note Title 2/7/2019

$y[n] + 2y[n-2] = 3x[n]$

$\delta[n] = \begin{cases} 1, & n = 0 \\ 0, & \text{o.w.} \end{cases}$

$y[n] = -2y[n-2] + 3x[n]$

Find the unit-pulse response of this system if $h[-2] = 0$, $h[-1] = 0$

$h[n] = -2h[n-2] + 3\delta[n]$

$n=0$ $h[0] = -2h[-2] + 3\delta[0] = 3 = 3(1) = 3(-2)^0$

$n=1$ $h[1] = -2h[-1] + 3\delta[1] = 0$

$n=2$ $h[2] = -2h[0] + 3\delta[2] = -6 = 3(-2)^1$

$n=3$ $h[3] = -2h[1] + 3\delta[3] = 0$

$n=4$ $h[4] = -2h[2] + 3\delta[4] = 12 = 3(4) = 3(-2)^2$

$n=5$ $h[5] = 0$

$n=6$ $h[6] = -24 = 3(-8) = 3(-2)^3$

$h[n] = 3(-2)^{\frac{n}{2}}$, $n = 0, 2, 4, 6, \ldots$

$= 0$ for all odd values of n

$$y[n] = 1.5y[n-1] - y[n-2] + 2x[n-2]$$

$h[n] = 1.5\,h[n-1] - h[n-2) + 2\delta[n-2]$

$h[0] = 1.5\,h[-1] - h[-2) + 2\delta[-2] = 0$

$h[1] = 1.5\,h[0] - h[-1] + 2\delta[-1] = 0$

$h[2] = 1.5\,h[1] - h[0] + 2\delta[0] = 2$

$h[3] = 1.5\,h[2] - h[1] + 2\delta[1] = 3$

$h[4] = 1.5\,h[3] - h[2] + 2\delta[2] = 2.5$

⋮ ⋮ ⋮

Compute the unit-pulse response of the following discrete-time system

$$y[n+2] + 3y[n] = x[n+1]$$

$h[n+2] = -3\,h[n] + \delta[n+1]$

$h[0] = -3h[-2] + \delta[-1] = 0$

$h[1] = -3\,h[-1] + \delta[0] = 1 = (-3)^0$

$h[2] = -3\,h[0] + \delta[1] = 0$

$h[3] = -3\,h[1] + \delta[2] = -3 = (-3)^1$

$h[4] = 0$

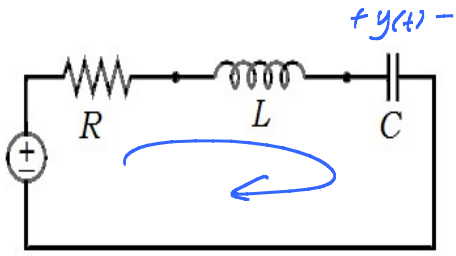
$h[5] = 9 = (-3)^2$

$h[6] = 0$

$h[7] = -27 = (-3)^3$

$h[n] = (-3)^{\frac{n-1}{2}}$, $n = 1, 3, 5, \ldots$

$h[n] = 0$ for all even values of n

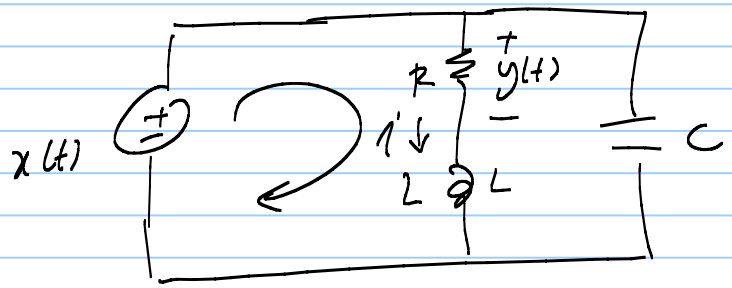


$$-x(t) + Ri(t) + L\frac{di(t)}{dt} + y(t) = 0$$

$$i(t) = C\frac{dv_c(t)}{dt} = C\frac{dy(t)}{dt}$$

$$-x(t) + RC\frac{dy(t)}{dt} + LC\frac{d^2y(t)}{dt^2} + y(t) = 0$$

$$\frac{d^2y(t)}{dt^2} + \frac{R}{L}\frac{dy(t)}{dt} + \frac{1}{LC}y(t) = \frac{1}{LC}x(t)$$



$$-x(t) + y(t) + L\frac{di(t)}{dt} = 0 \quad ; \quad i(t) = \frac{y(t)}{R}$$

$$-x(t) + y(t) + \frac{L}{R}\frac{dy(t)}{dt} = 0$$

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