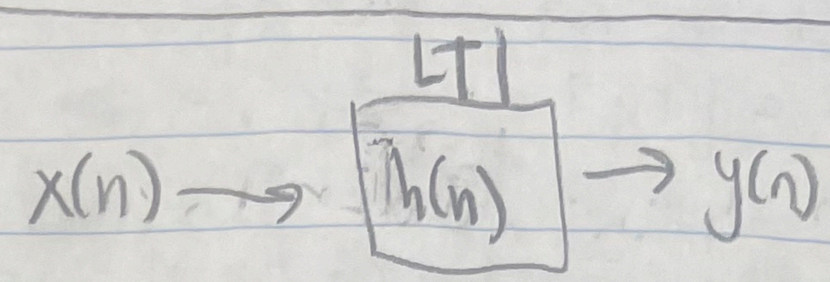
Transystor is Nonlinear
Most practical systems are nonlinear when range is large

5.15



$$y(n) = \sum_{k=-\infty}^{\infty} h[k]\, x[n-k]$$

a. $h[n] = \delta[n-3]$ $\quad y[n] = 5u[n-2] - u[n-6]$

$x[n] = 5u[n+1] - u[n-3]$

b. $h[n] = u[n-2]$
$x[n] = x[n] - x[n-1]$

$n=0$ $\quad \sum_{k=-\infty}^{\infty} h[k]\, x[-k] = 0$

$n=1$ " $h[k]\, x[1-k] = 1$

$n=2$ $\quad = 1$

$y[n] = x[n-1]$?

Tabular Method of Convolution

6. $y[n] = x[n] - x[n-1]$

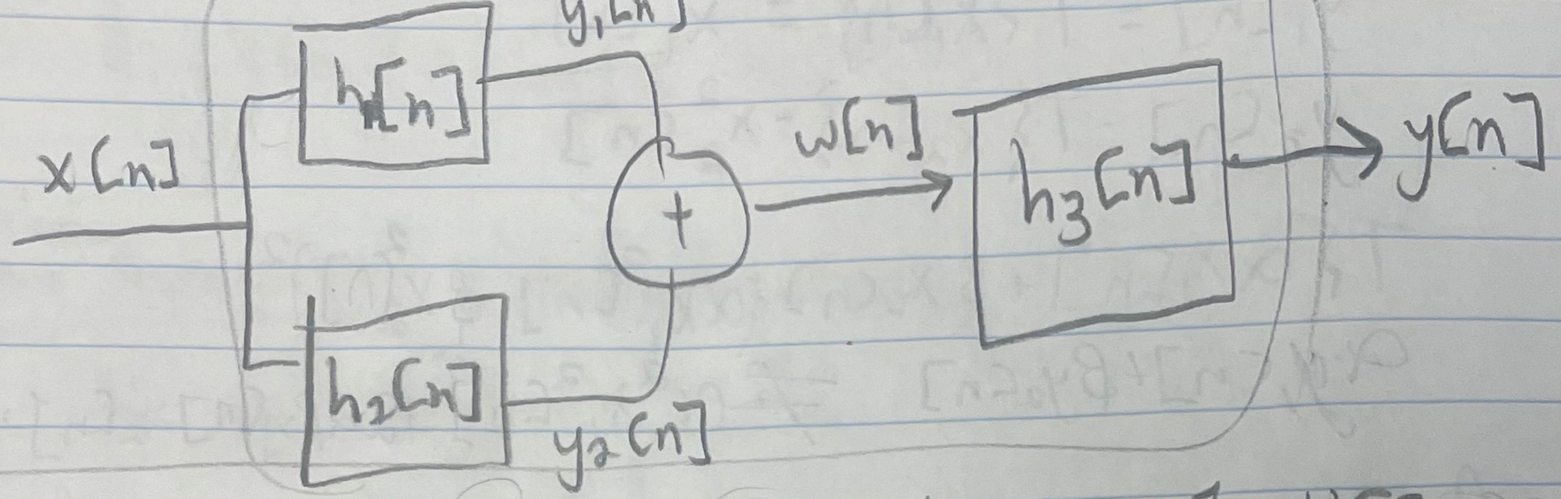
$n=-2 \quad y[-2] = x[-2] - x[-3] = 0$

$\vdots$

$n=2 \quad y[2] = x[2] - x[1] = 1$

5.14

a.



$h_1[n] = \delta[n] + 2\delta[n-1] + 3\delta[n-2] + 4\delta[n-3]$

$h_2[n] = \delta[n] + \delta[n-1] + \delta[n-2] + \delta[n-3]$

$h_3[n] = \delta[n] - \delta[n-1]$

b. $y_1[n] = h_1[n] * x[n]$

$y_2[n] = h_2[n] * x[n]$

$w[n] = y_1[n] + y_2[n]$

$y[n] = h_3[n] * w[n]$

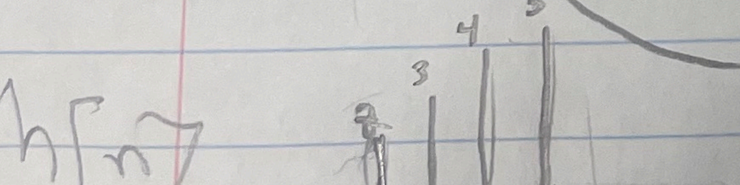
$= h_3[n] * (y_1[n] + y_2[n])$

$= h_3[n] * (h_1[n] * x[n] + h_2[n] * x[n])$

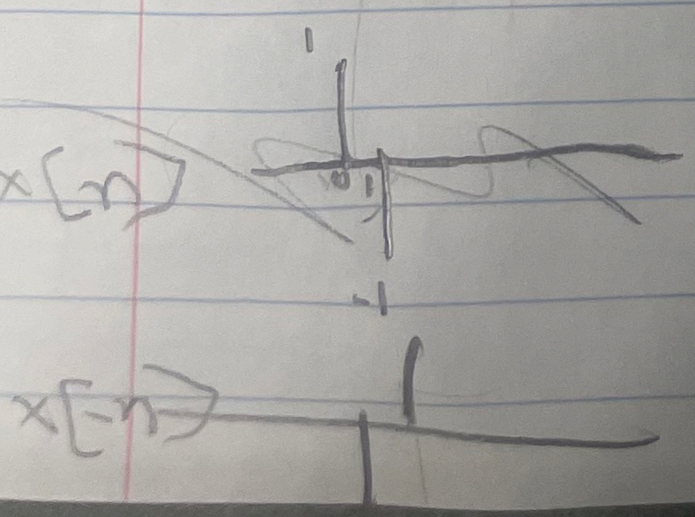
$= [h_3[n] * (h_1[n] + h_2[n])] * x[n]$

$= [h_3[n] * (2\delta[n] + 3\delta[n-1] + 4\delta[n-2] + 5\delta[n-3])] * x[n]$

$= [\delta[n] - \delta[n-1] *$] $* x[n]$



$(2\delta[n] + \delta[n-1] + \delta[n-2] + \delta[n-3] - 5\delta[n-4]) * x[n]$



n=2 → 1

n=3 → -5

n=4 → -5