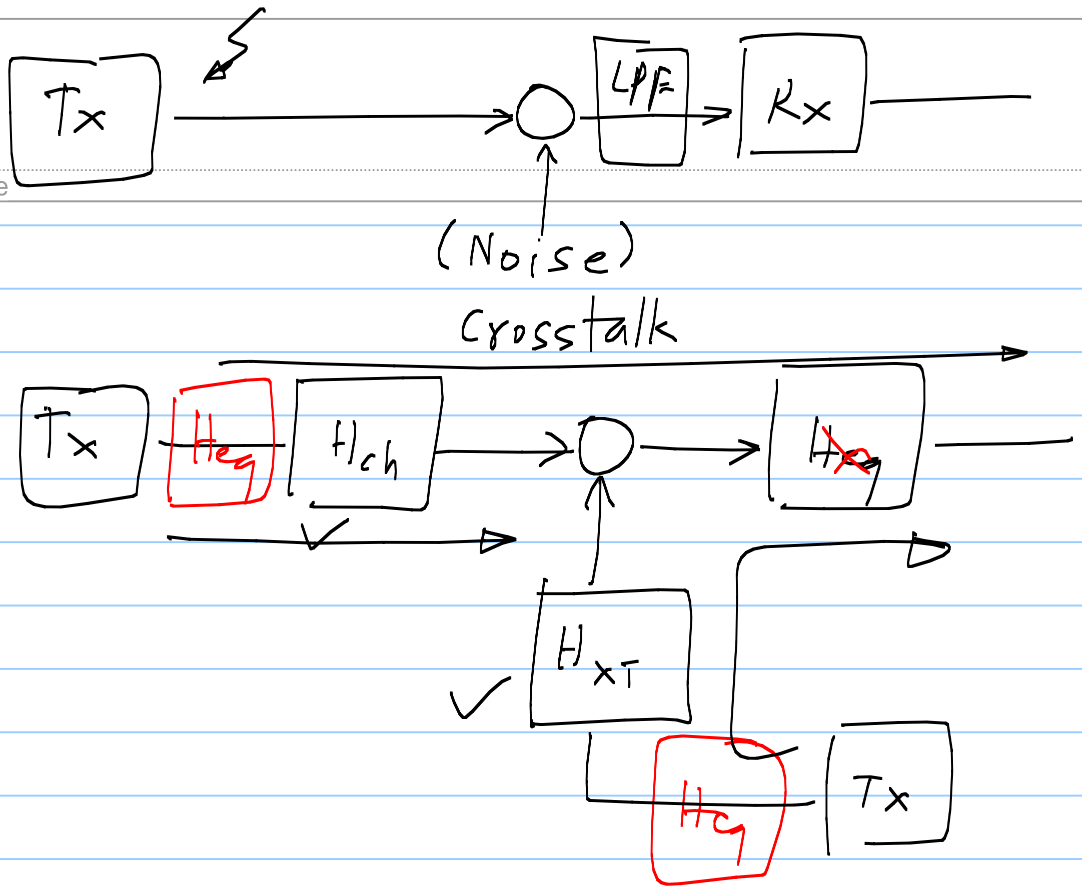
Note Title

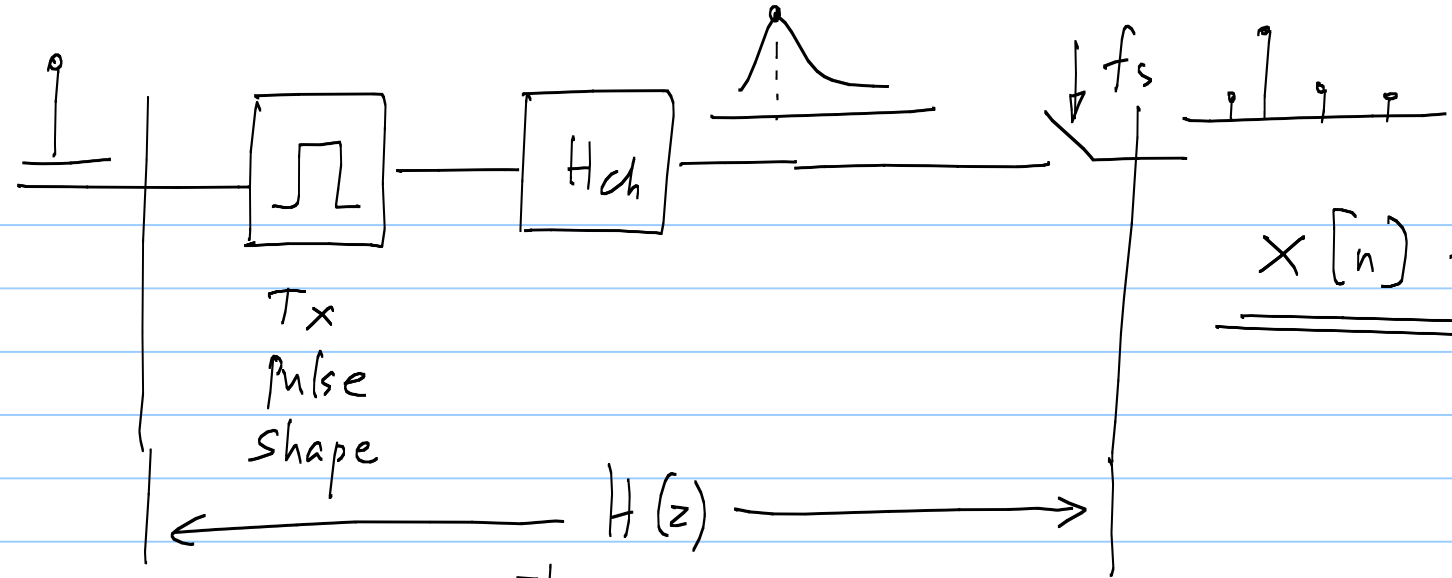
03-10-2007



$$\left(H_{ch} \cdot H_{eq}\right) = 1$$

$$H_{eq} = \frac{1}{H_{ch}}$$

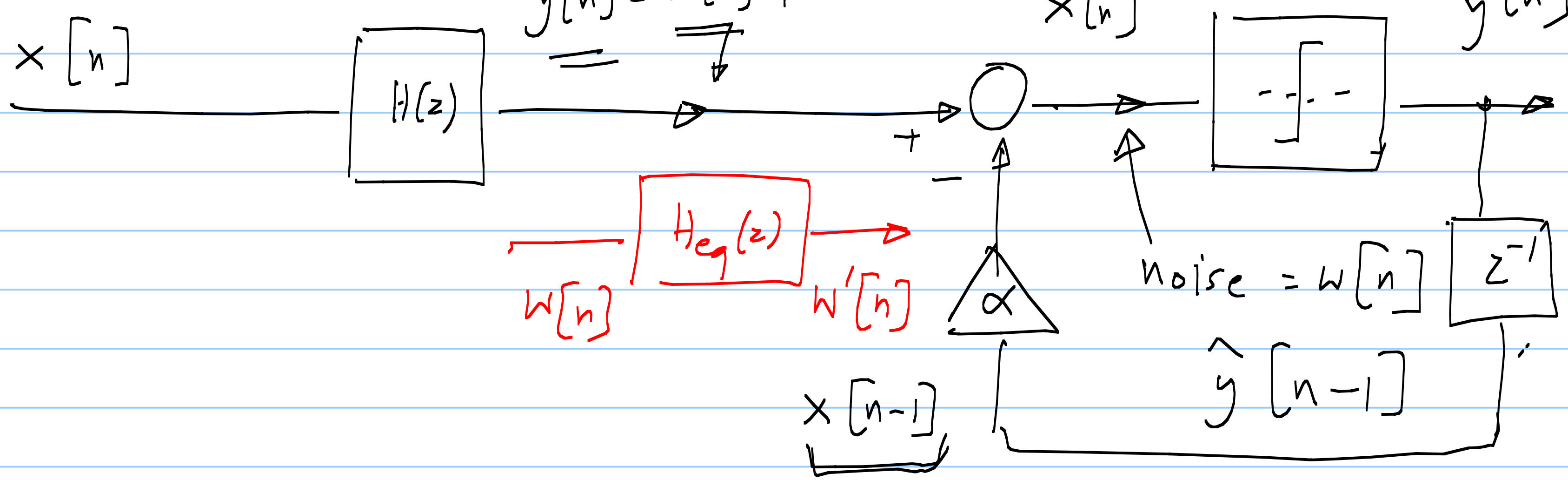
$$\left[\frac{H_{xT}}{H_{ch}}\right]$$

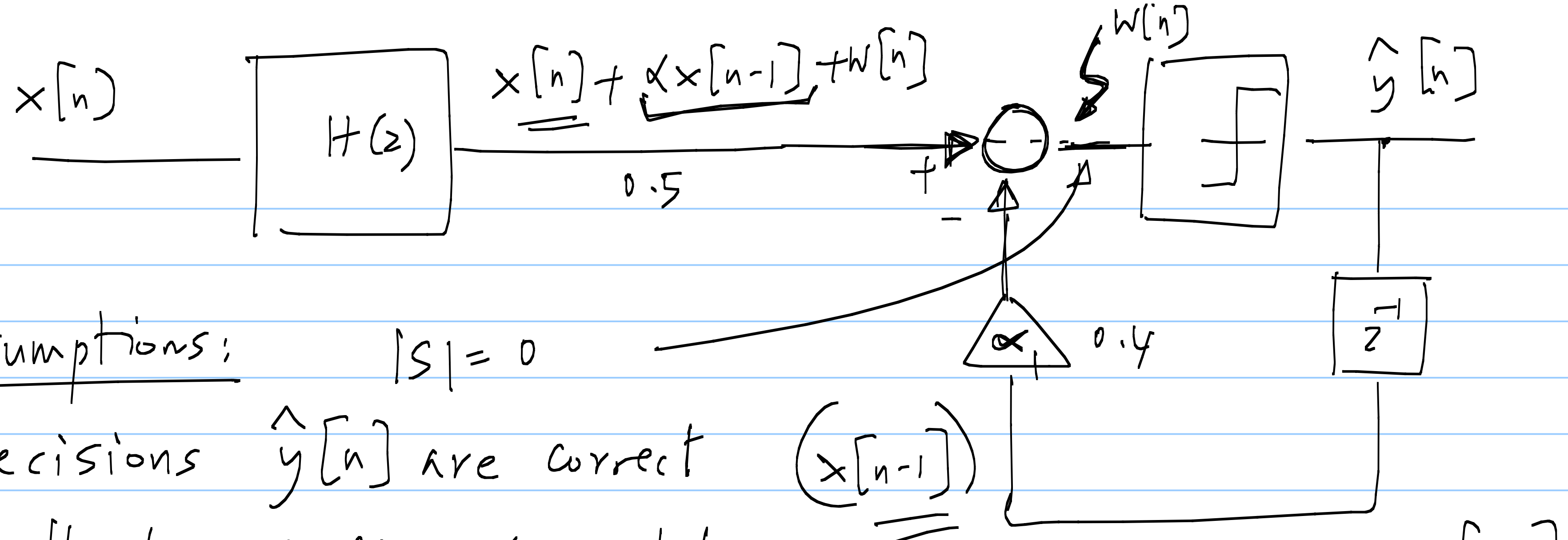


$$x[n] + \underbrace{\alpha x[n-1]}$$

$$H(z) = 1 + \alpha z^{-1}$$

$$y[n] = x[n] + \underbrace{\alpha x[n-1]} + w[n]$$



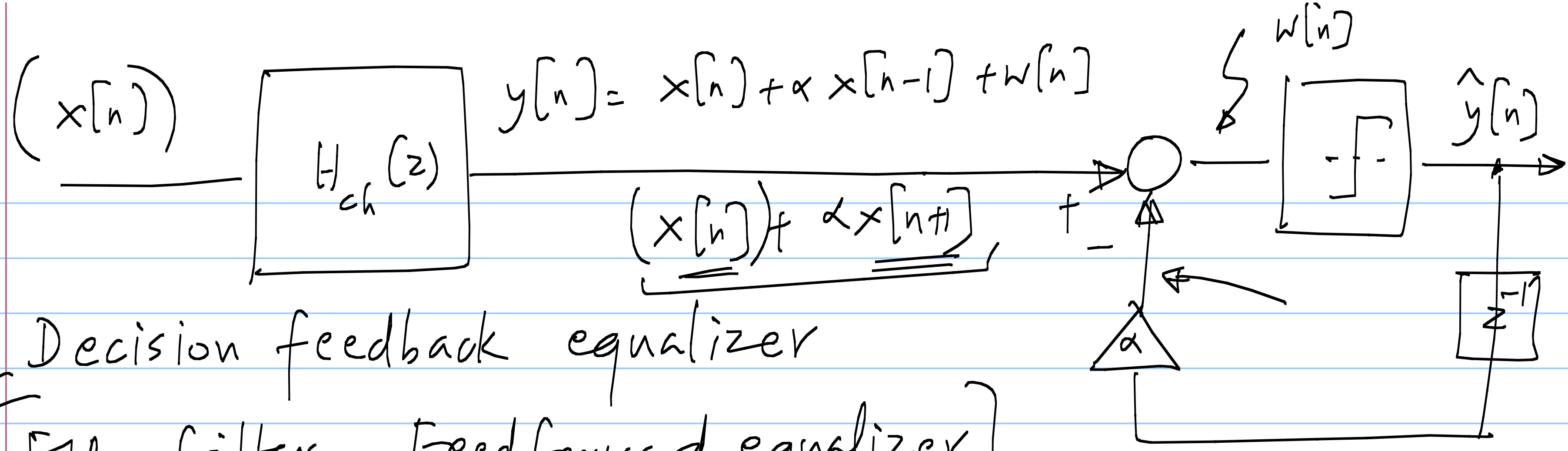


Assumptions:

* Decisions $\hat{y}[n]$ are correct

* Feedback coeff. α matches the channel characteristics

Assumes $\hat{y}[n-1] = x[n-1]$

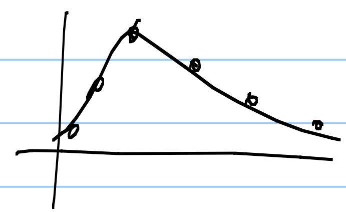


* Decision feedback equalizer

[FIR filter − Feedforward equalizer]

→ Based on the assumption of correct decisions

$\Rightarrow$ Error propagation

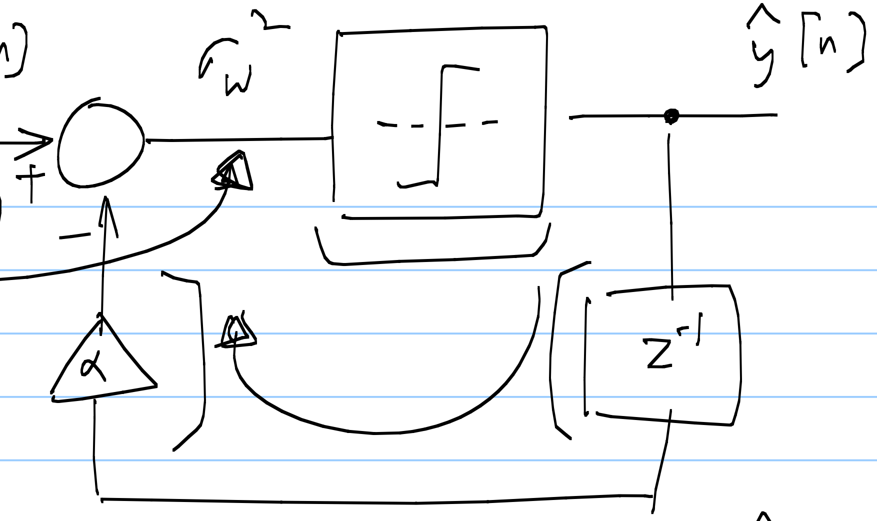


− Can only cancel post-cursor (s)

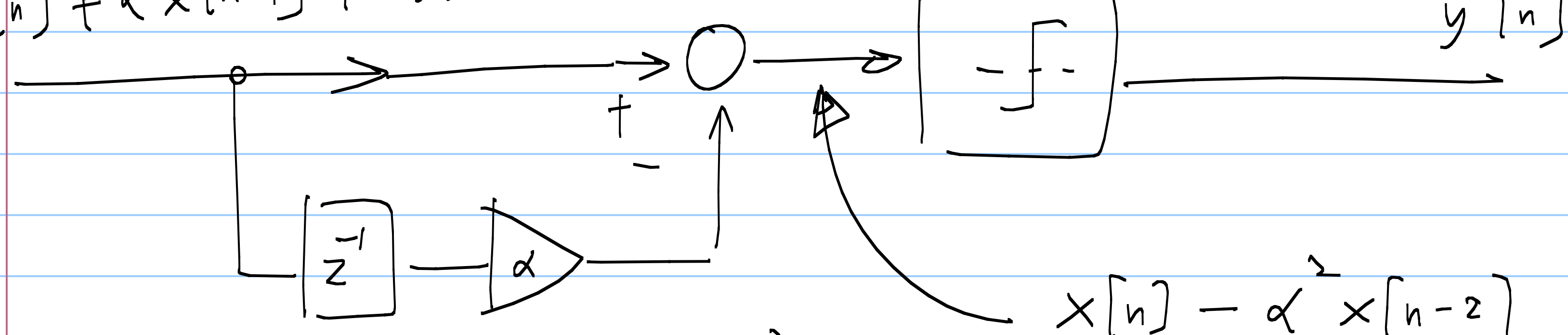
\+ High frequency noise is not amplified

$y[n] = x[n] + \underbrace{\alpha x[n-1]} + w[n]$

$x[n] + \alpha\left(\underline{\underline{x[n-1]}} - \underline{\underline{\hat{y}[n-1]}}\right) + \underline{\underline{w[n]}}$



$x[n] + \alpha x[n-1] + w[n]$



$x[n] - \alpha^2 x[n-2]$

$+ \quad w[n] - \alpha w[n-1]$

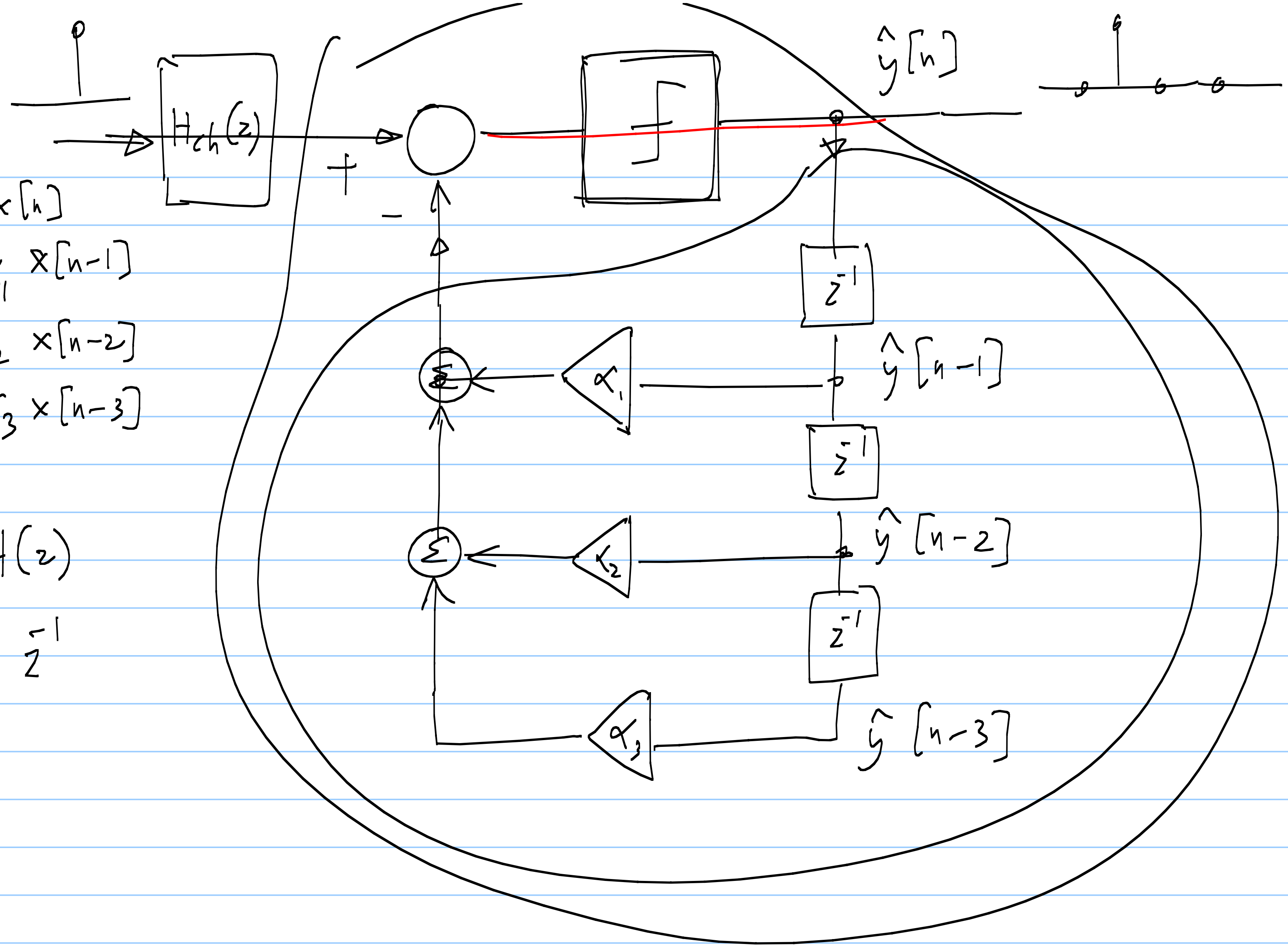
$\underbrace{\sigma_w^2 (1 + \alpha^2)}$

Noise amplification

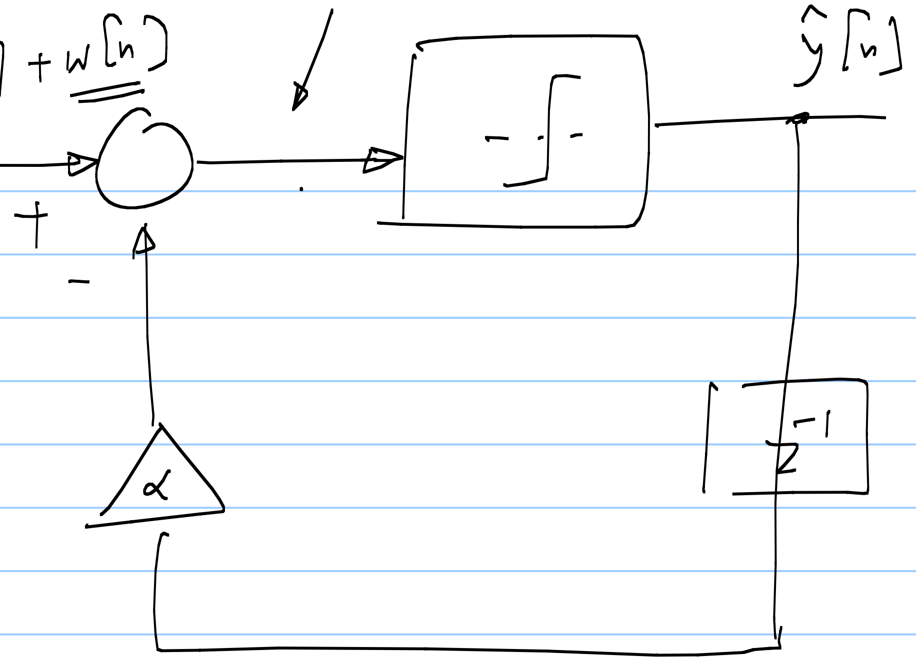
$$x[n] + \alpha_1 x[n-1] + \alpha_2 x[n-2] + \alpha_3 x[n-3]$$

$H(z)$

z^{-1}



$$y[n] = \overbrace{\underline{\underline{x[n]}} + \alpha x[n-1]} + \underline{\underline{w[n]}}$$



x : ± 1

$\hat{y}$: ± 1

$P_E = p(\hat{y}[n] \neq x[n])$

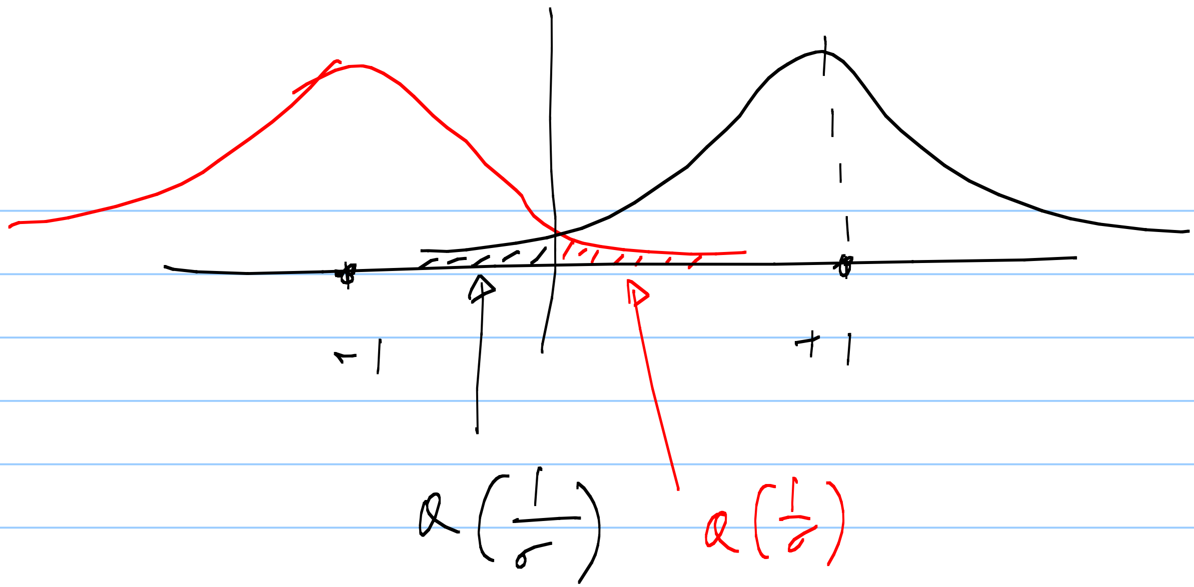
$=$

1) Feedback is correct: Signal $= \pm 1$; $Q\left(\frac{1}{\sigma_w}\right)$

Noise $= \sigma_w$

2) Feedback is incorrect signal $= \begin{cases}(1+2\alpha) \to Q\left(\frac{1+2\alpha}{\sigma_w}\right) \\ (1-2\alpha) \to Q\left(\frac{1-2\alpha}{\sigma_w}\right)\end{cases}$

Noise $= \sigma_w$



-1
+1
$Q\left(\frac{1}{\sigma}\right)$
$Q\left(\frac{1}{\sigma}\right)$