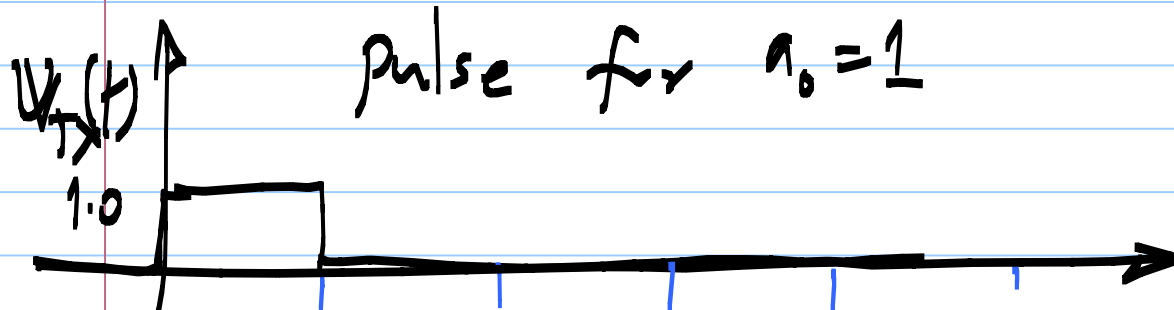
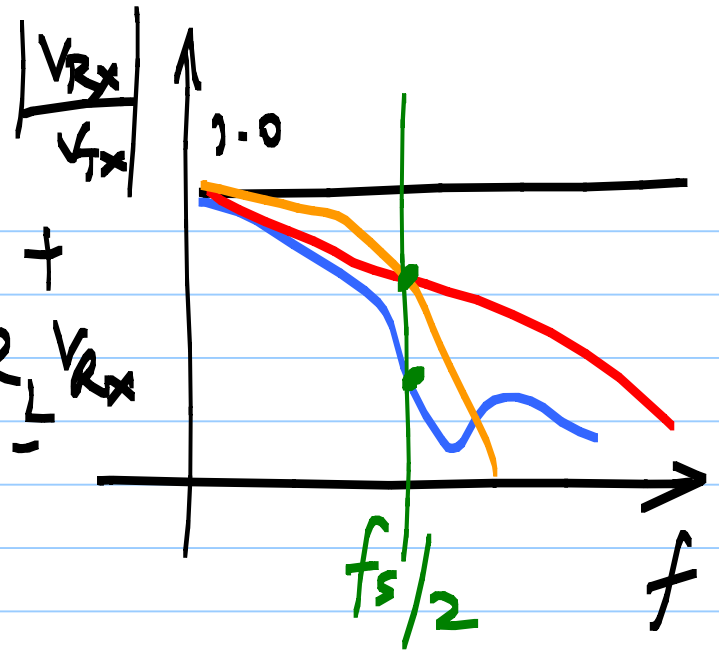
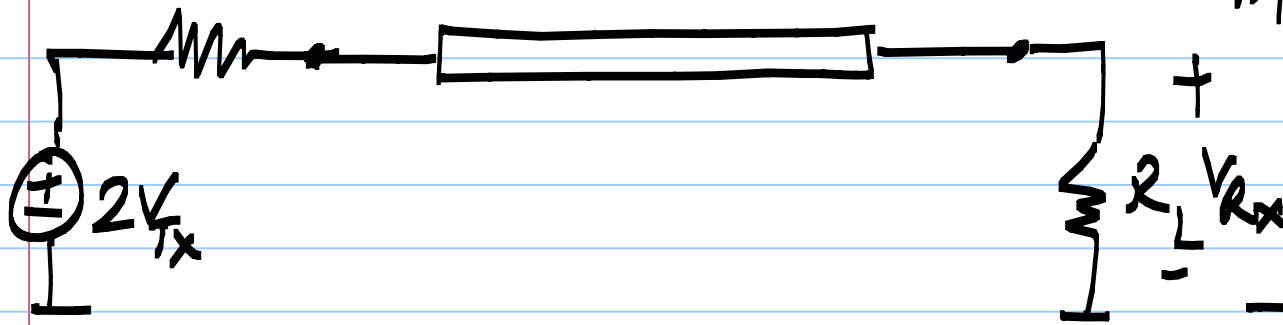
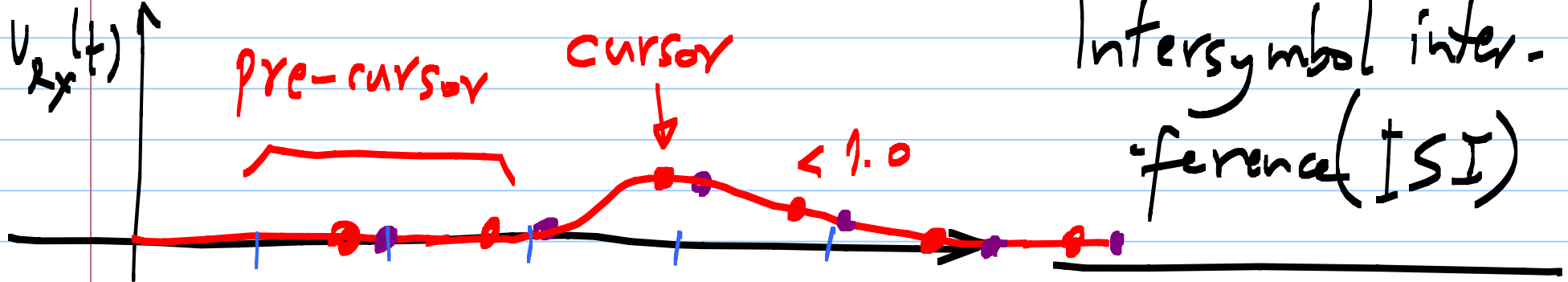


$R_s$  Attenuation @  $f_s/2$

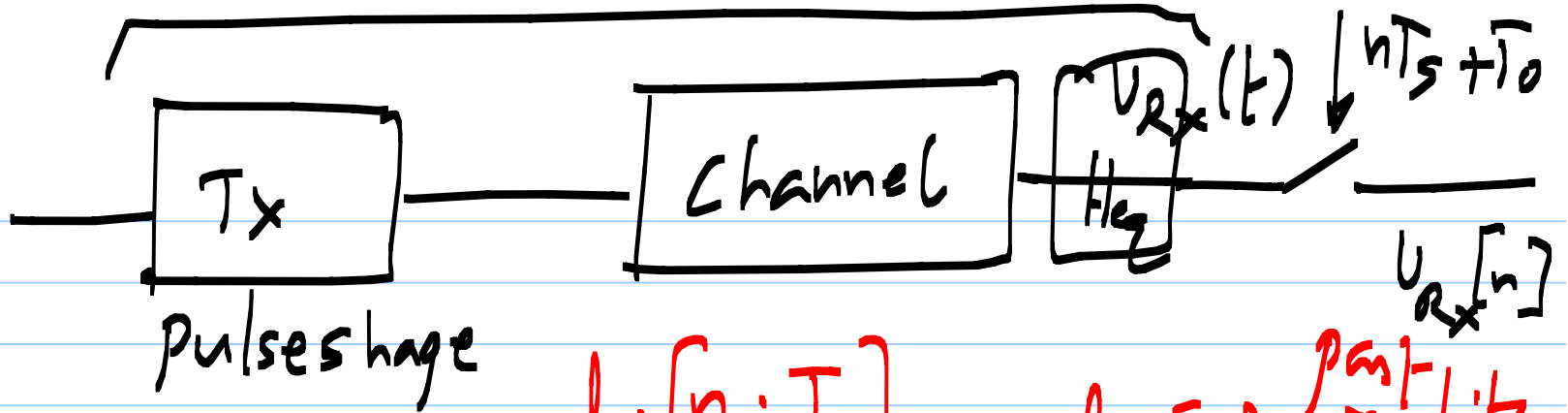


pulse for  $a_0 = 1$

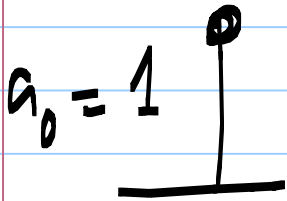
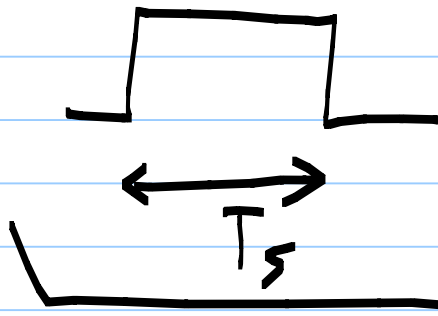


Intersymbol interference (ISI)

$\{a_k\}$

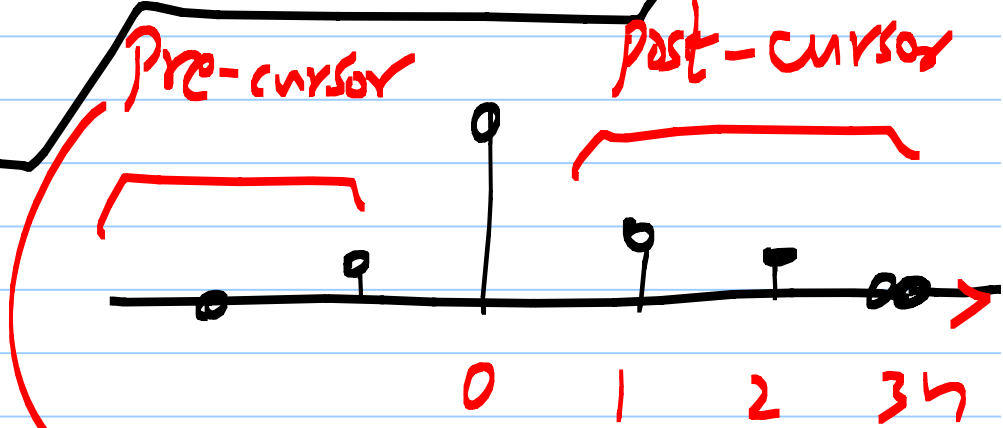


NRZ signaling



$h_d[n; T_0]$

$h_d[n]$  past-bits



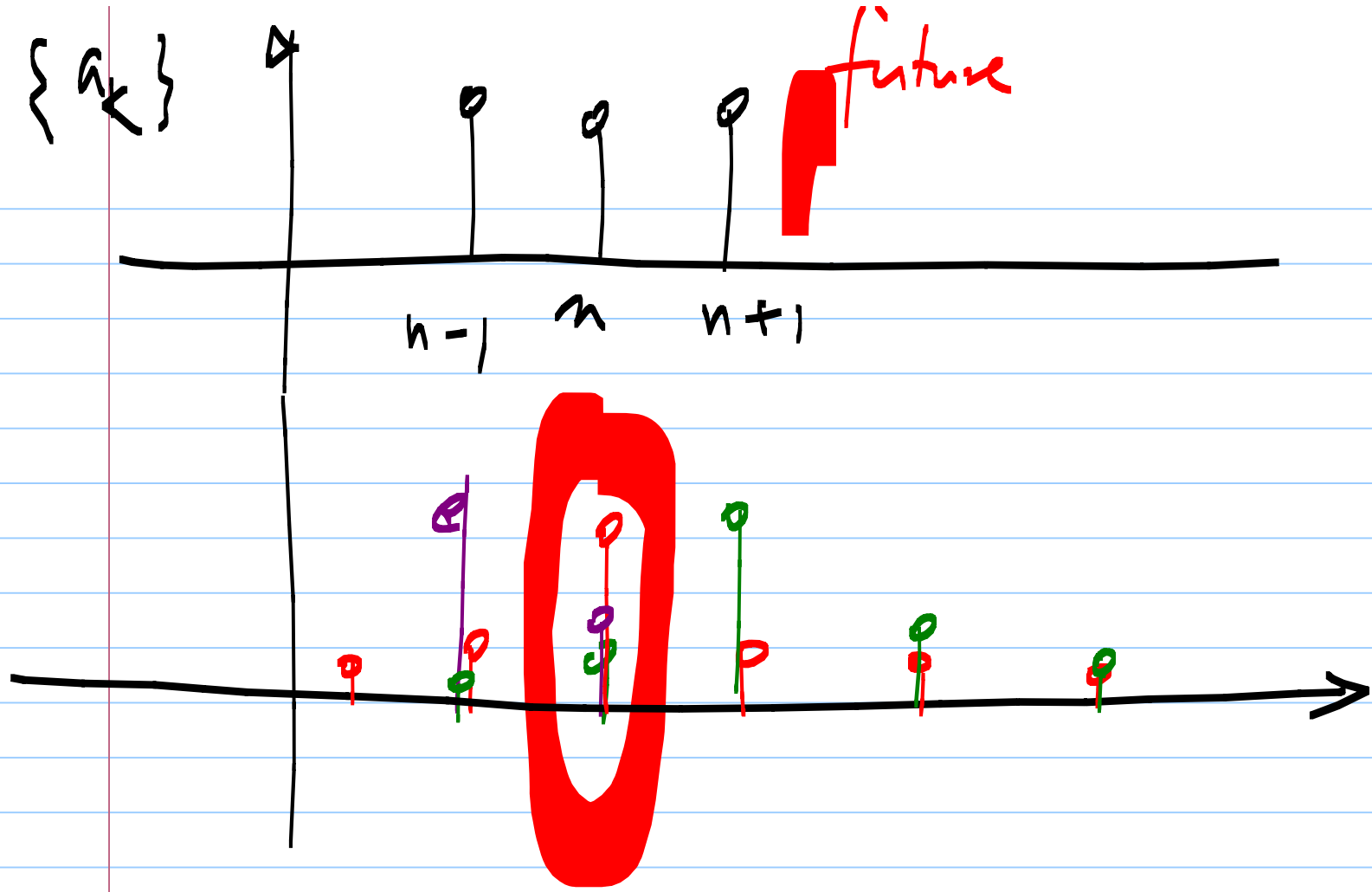
$$u_{Rx}[n] = \sum_{k=-\infty}^{\infty} a_k h_d[n-k]$$

future bits

$\{ \hat{a}_k \}$

future

$n-1$   $n$   $n+1$



$$u_{rx}[n] = \sum_{k=-\infty}^{\infty} a_k h[n-k]$$

Ideally:

$$\underline{h[n] = \delta[n]}$$

$n=0$ :  $\underline{a_0 = 1}$   $\underline{h[n]}$

$$a_0 h[0] + \sum_{k \neq 0} a_k h[-k]$$

cursor

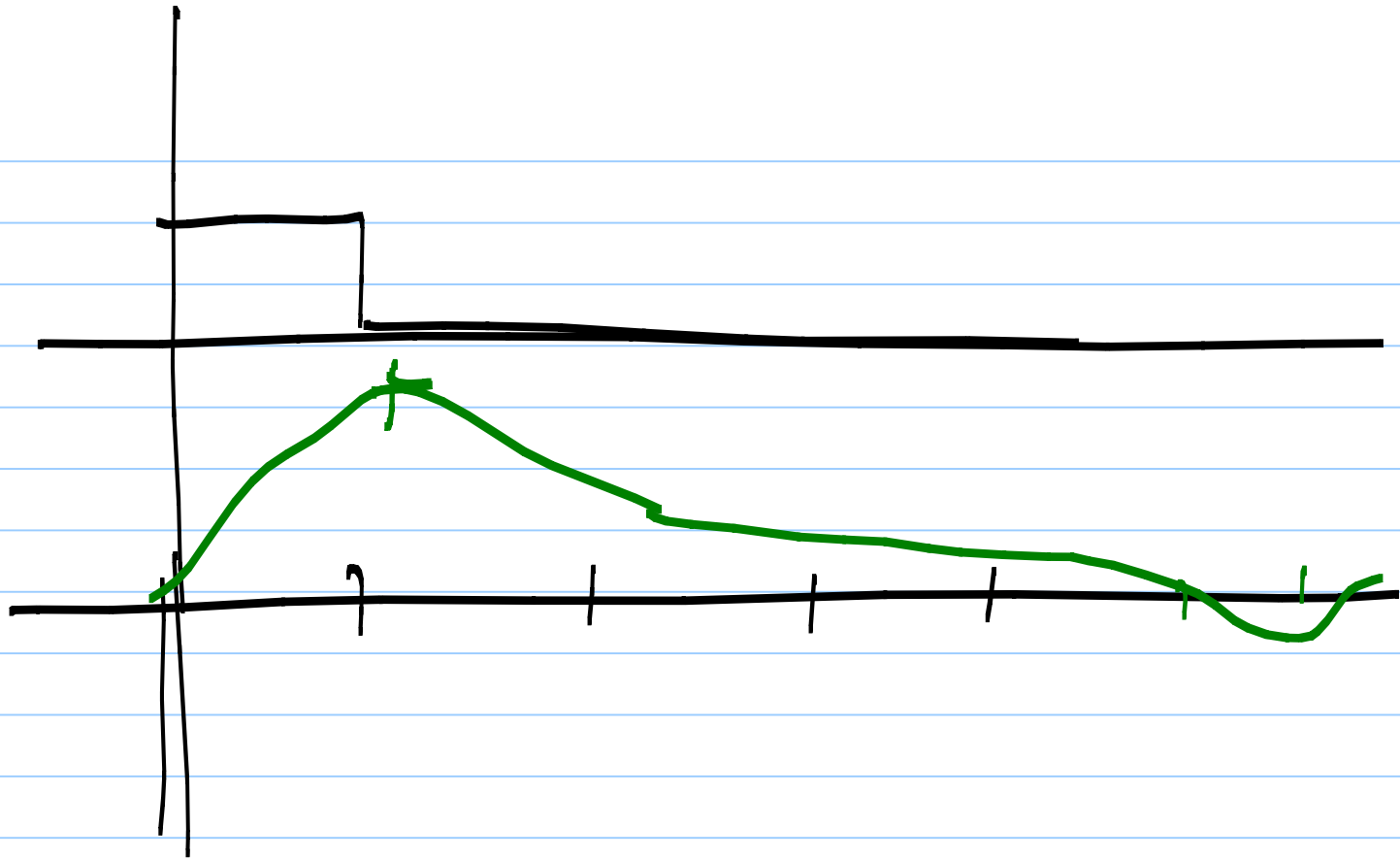
$$\underline{h[0] > 0}$$

$|S|$

$$a_k = -\text{sgn}(h[-k])$$

results  
in the  
worst case

$|S|$



$$v_{rx}[n] = \underbrace{a_n h[0]}_{\text{Desired}} + \underbrace{\sum_{k \neq 0} a_k h[n-k]}_{\text{Un desired}}$$

Ideally

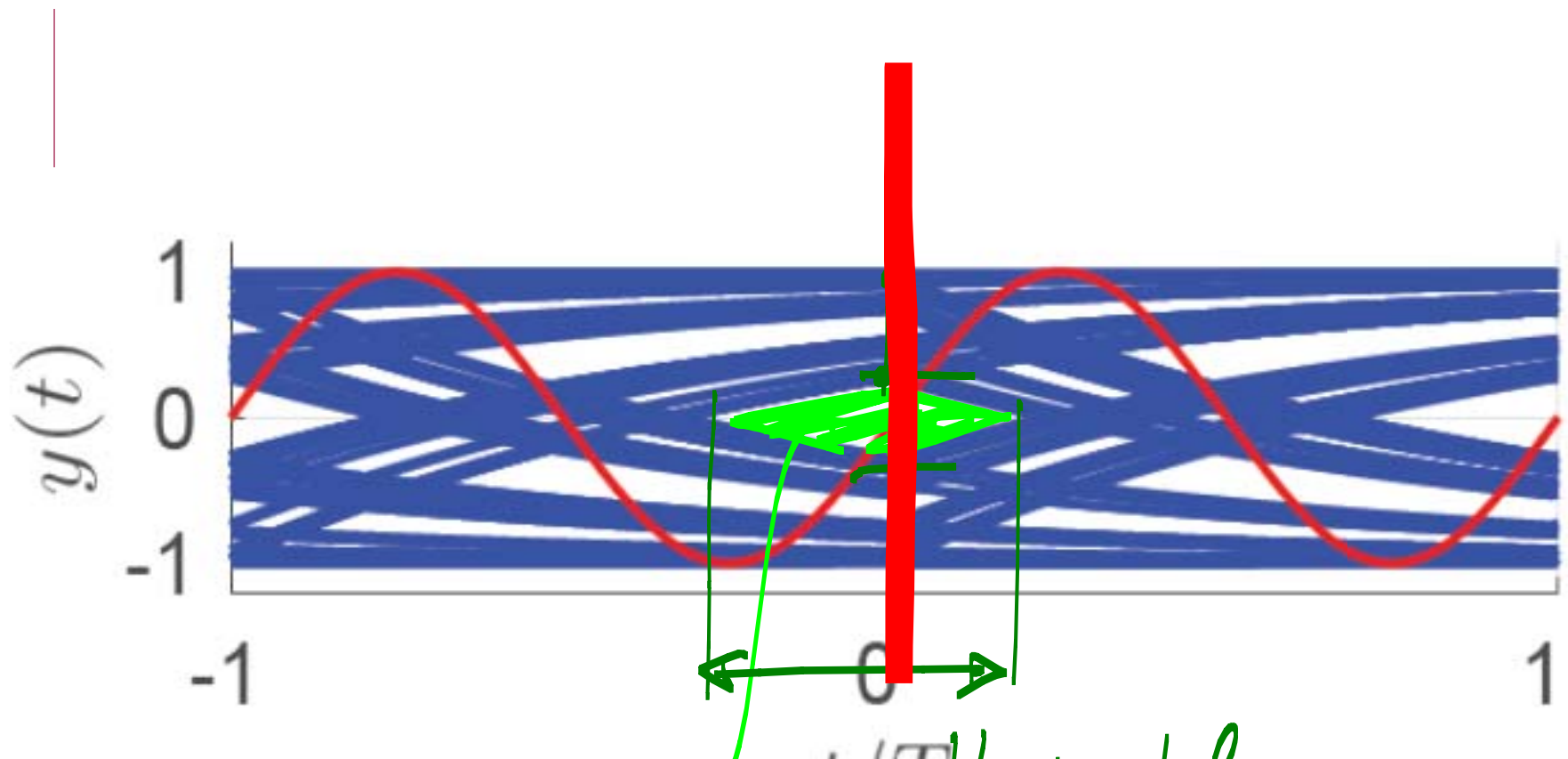
$$a_n h[0]$$

Worst case

$$a_n h[0] - \sum_{k \neq 0} a_k h[n-k]$$

best case

$$a_n h[0] + \sum_{k \neq 0} a_k h[n-k]$$



Eye opening

Horizontal eye opening

