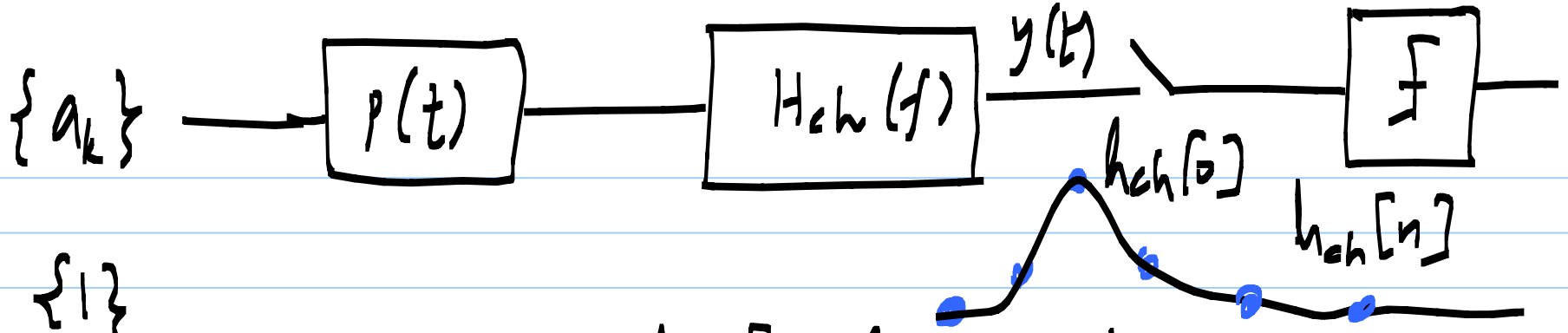
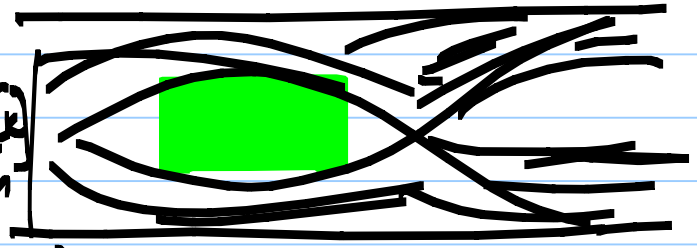


$\{1\}$

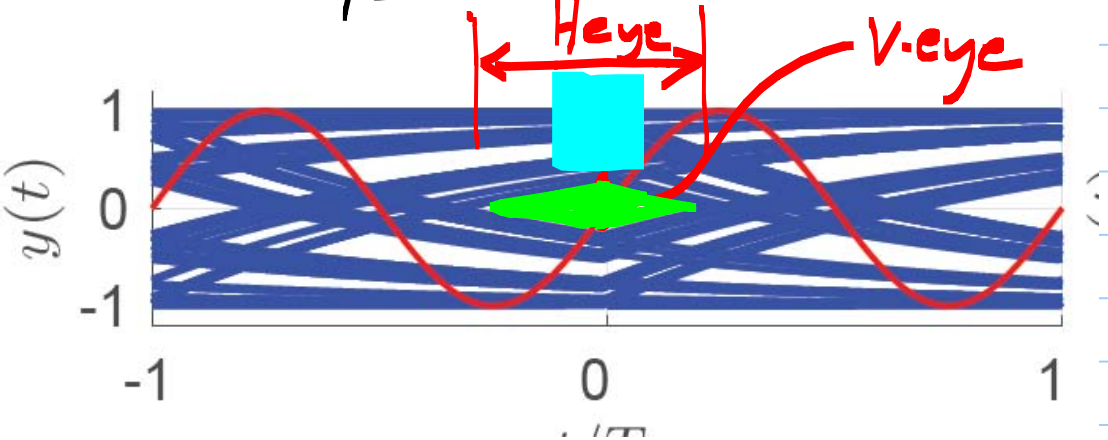
$h_{ch}[0] + h_{ch}[k]$ Sampled pulse response

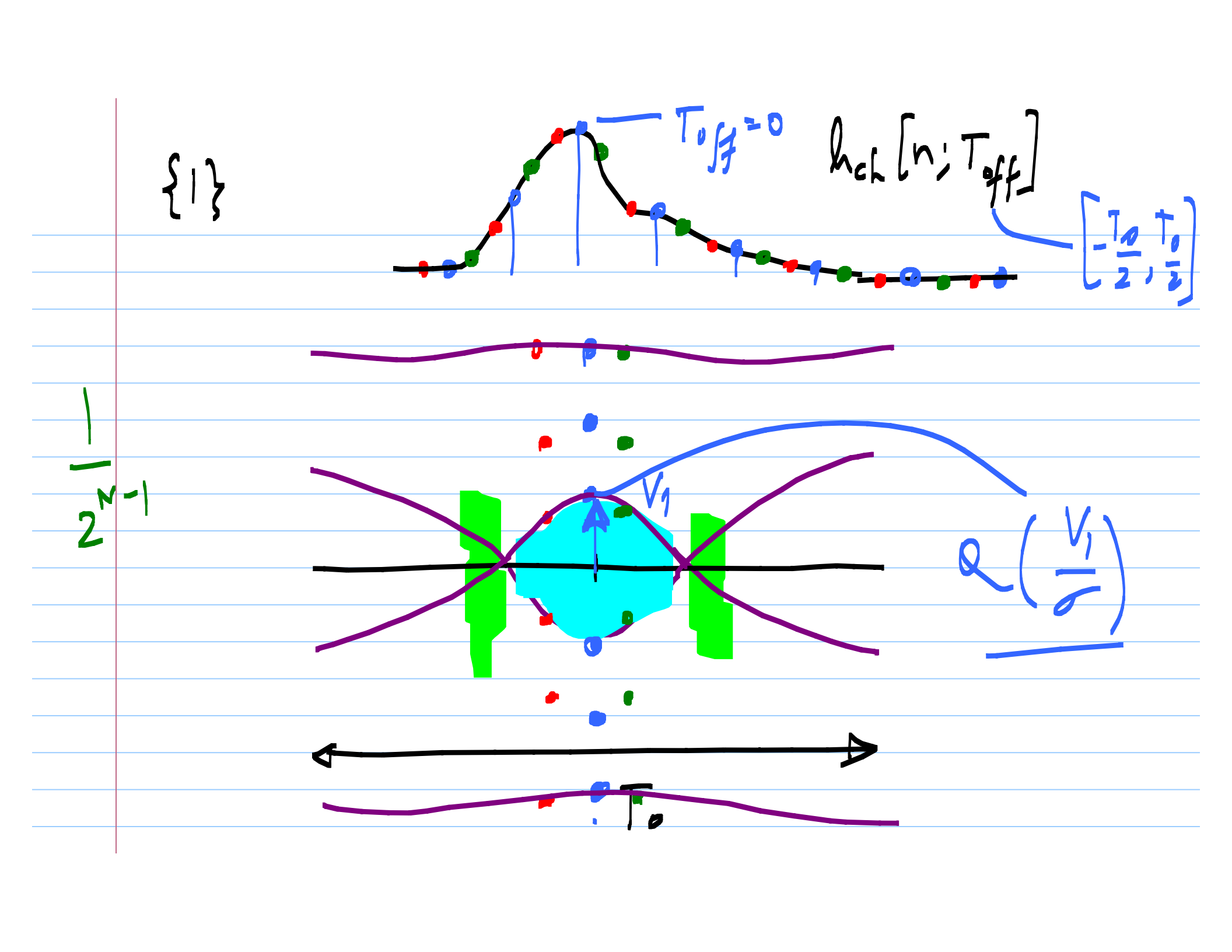
$\{a_k\}$

$h_{ch}[0] - \sum_{k \neq 0} h_{ch}[k]$



Random data




{1}
$T_{off} = 0$
$h_{ch}[n; T_{off}]$
$\left[-\frac{T_0}{2}, \frac{T_0}{2}\right]$
$\frac{1}{2^{N-1}}$
V_1
$Q\left(\frac{V_1}{\sigma}\right)$
T_0

Horizontal eye opening: clock timing jitter

Vertical eye opening: sampling SNR

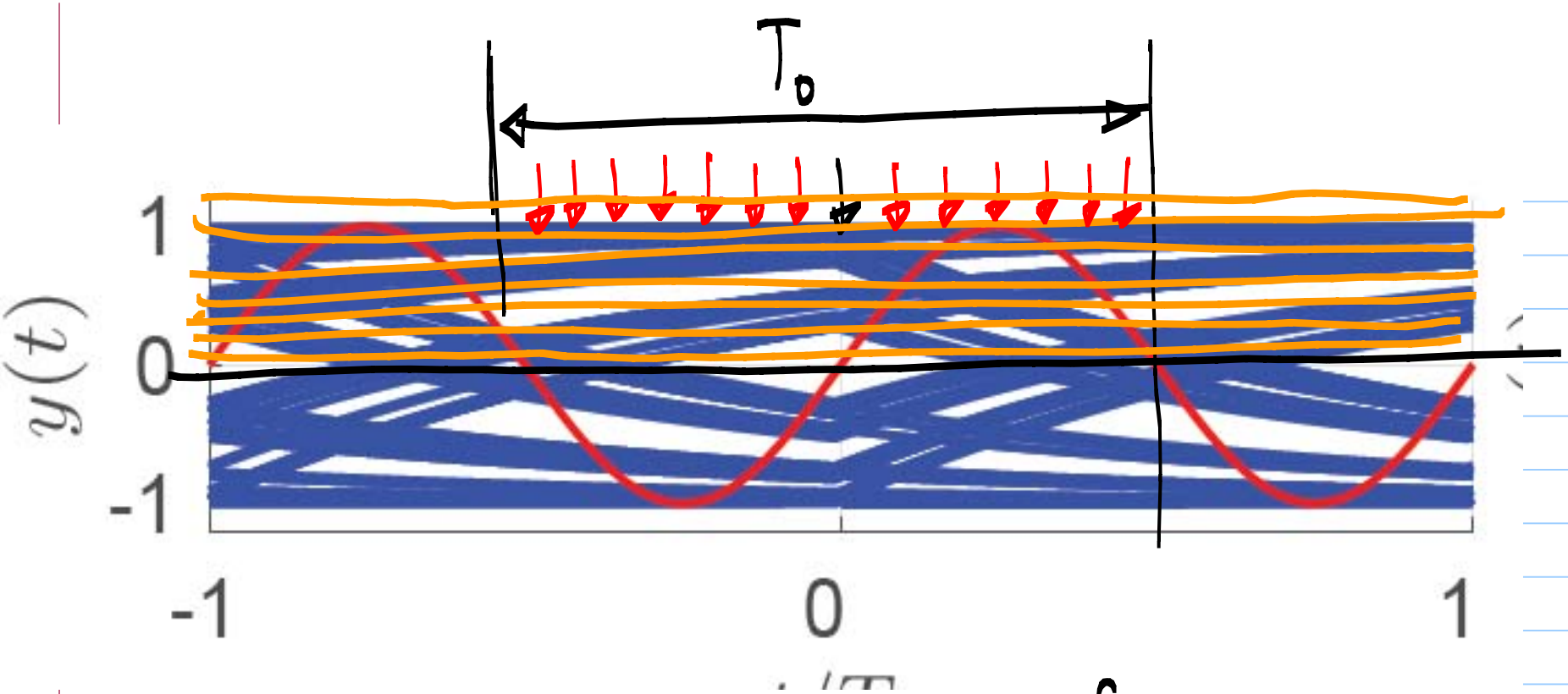
Statistical eye: $h_{ch}[n; T_{sys}]$

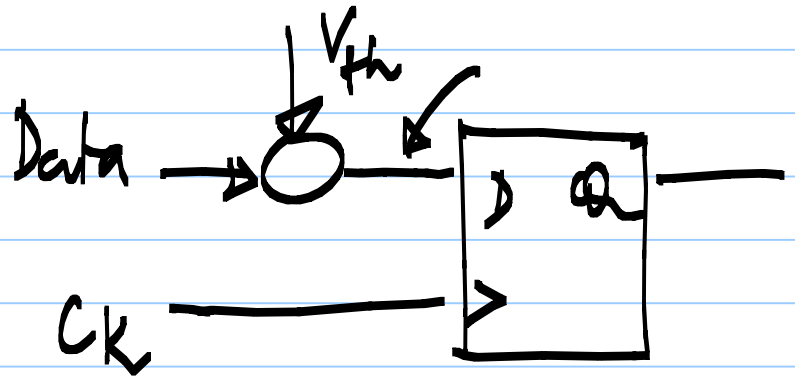
$h_{ch}[n] = \{0.25, 0.75, 0.25\}$ ← BER

2^{N-1} bit patterns

	−1	−1	0.25
	−1	+1	0.75
	+1	−1	0.75
	+1	+1	1.25

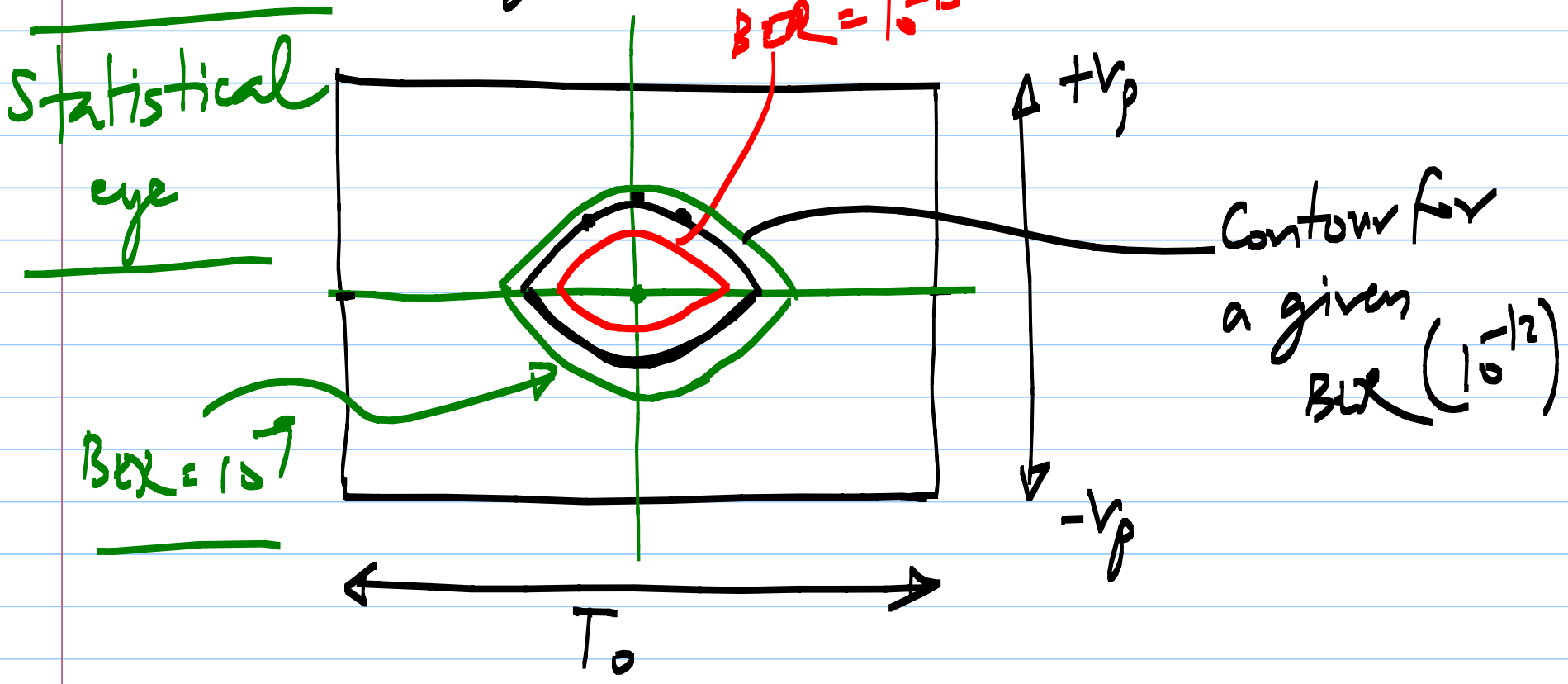
$$\frac{1}{4}\left[Q\left(\frac{0.25}{\sigma_n}\right) + Q\left(\frac{0.75}{\sigma_n}\right) + Q\left(\frac{0.75}{\sigma_n}\right) + Q\left(\frac{1.25}{\sigma_n}\right)\right]$$

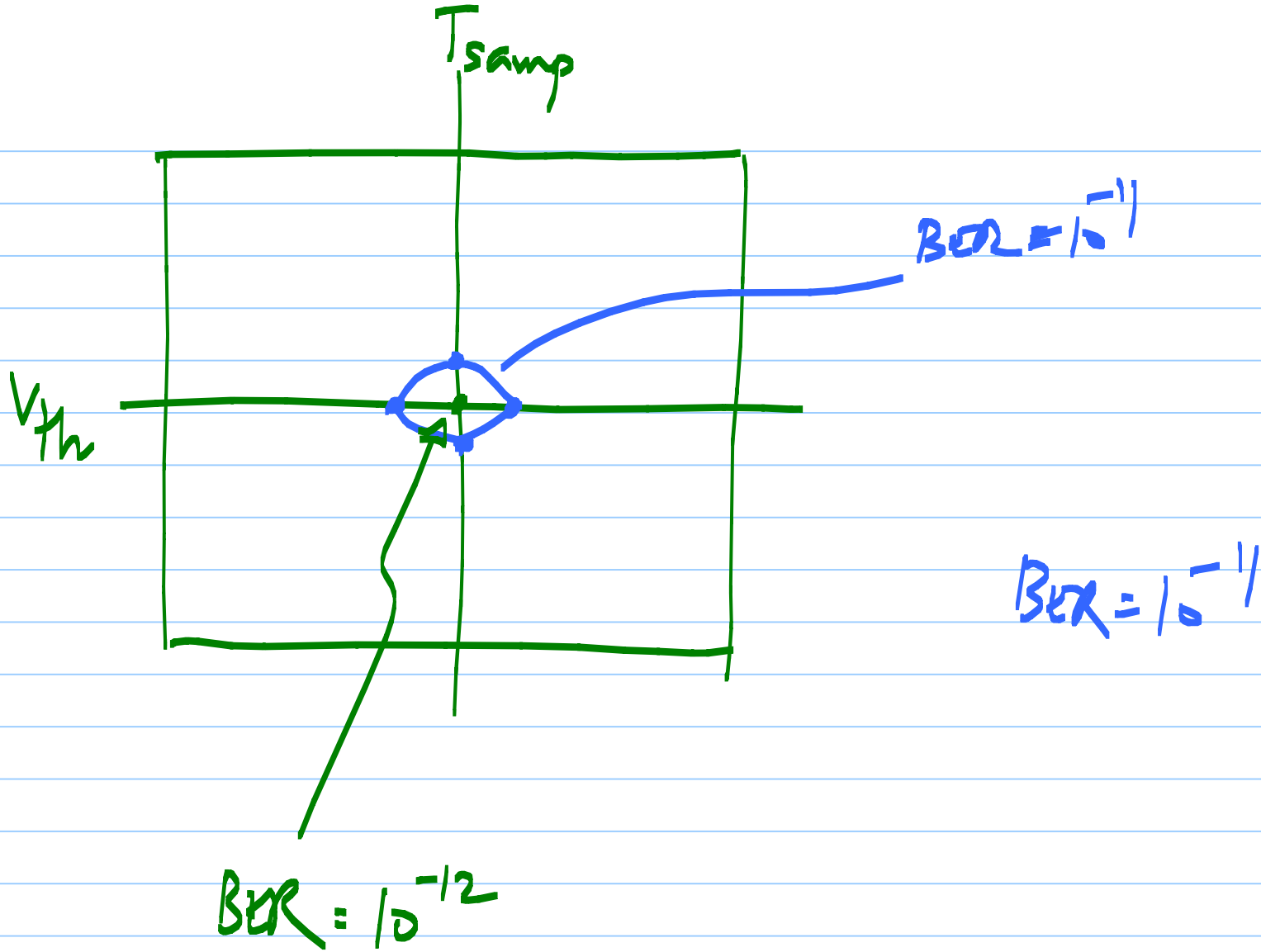


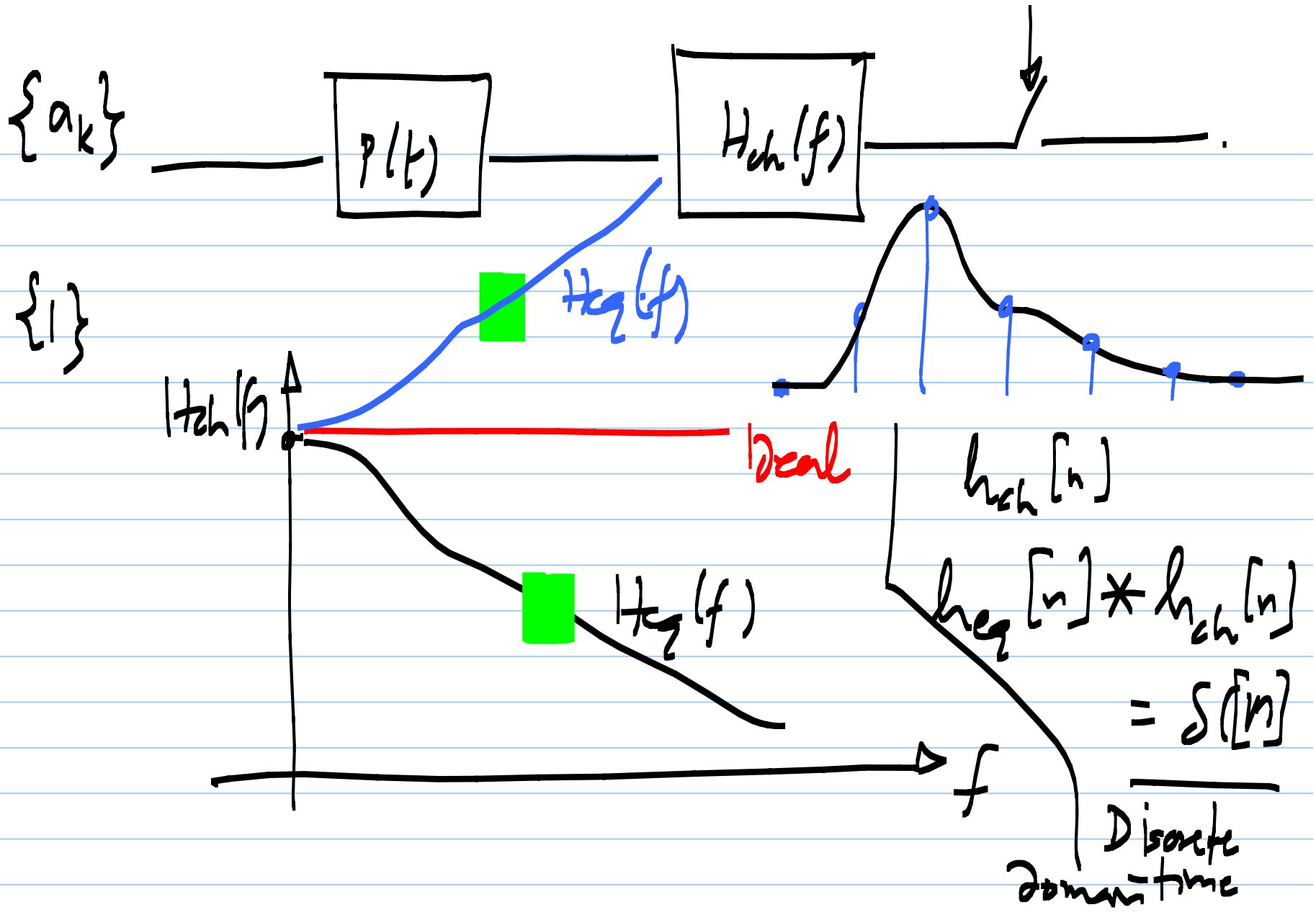


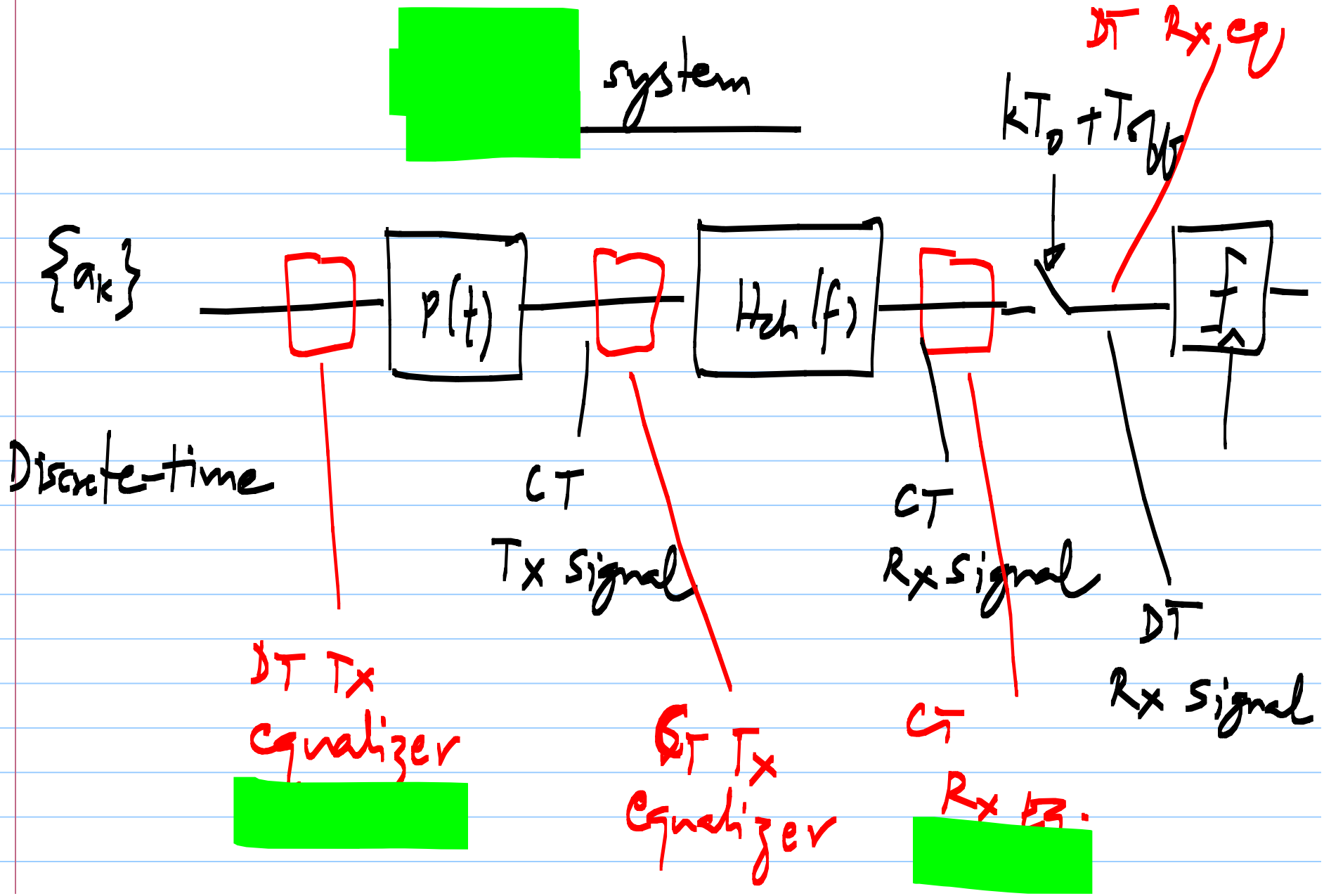
$$\frac{1}{2}\left[Q\left[\frac{V_i + V_{th}}{\sigma_n}\right] + Q\left[\frac{-V_i + V_{th}}{\sigma_n}\right]\right]$$

For every combination of timing offset and threshold voltage, there is a BER value




T_{samp}
V_{th}
BER = 10^{-11}
BER = 10^{-11}
BER = 10^{-12}


$\{a_k\}$
$p(t)$
$H_{ch}(f)$
$\{I\}$
$H_{eq}(f)$
$|H_{ch}(f)|$
Ideal
$h_{ch}[n]$
$h_{eq}[n] * h_{ch}[n]$
$= \delta[n]$
$H_{eq}(f)$
f
Discrete domain time


system
DT Rx eq
$kT_0 + T_{off}$
$\{a_k\}$
p(t)
$H_{ch}(f)$
f
Discrete-time
CT
Tx signal
CT
Rx signal
DT
Rx signal
DT Tx
equalizer
DT Tx
equalizer
CT
Rx Eq.