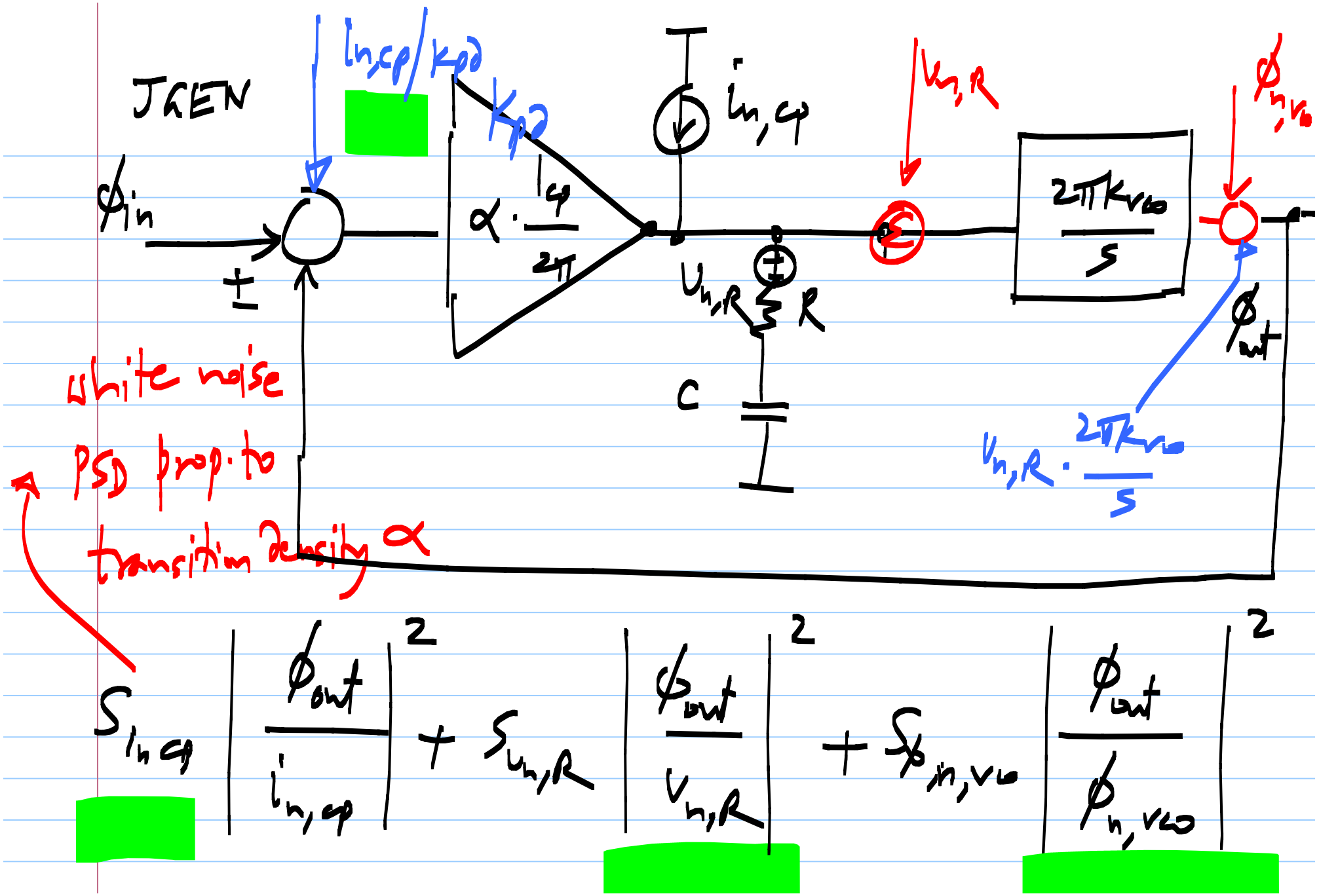
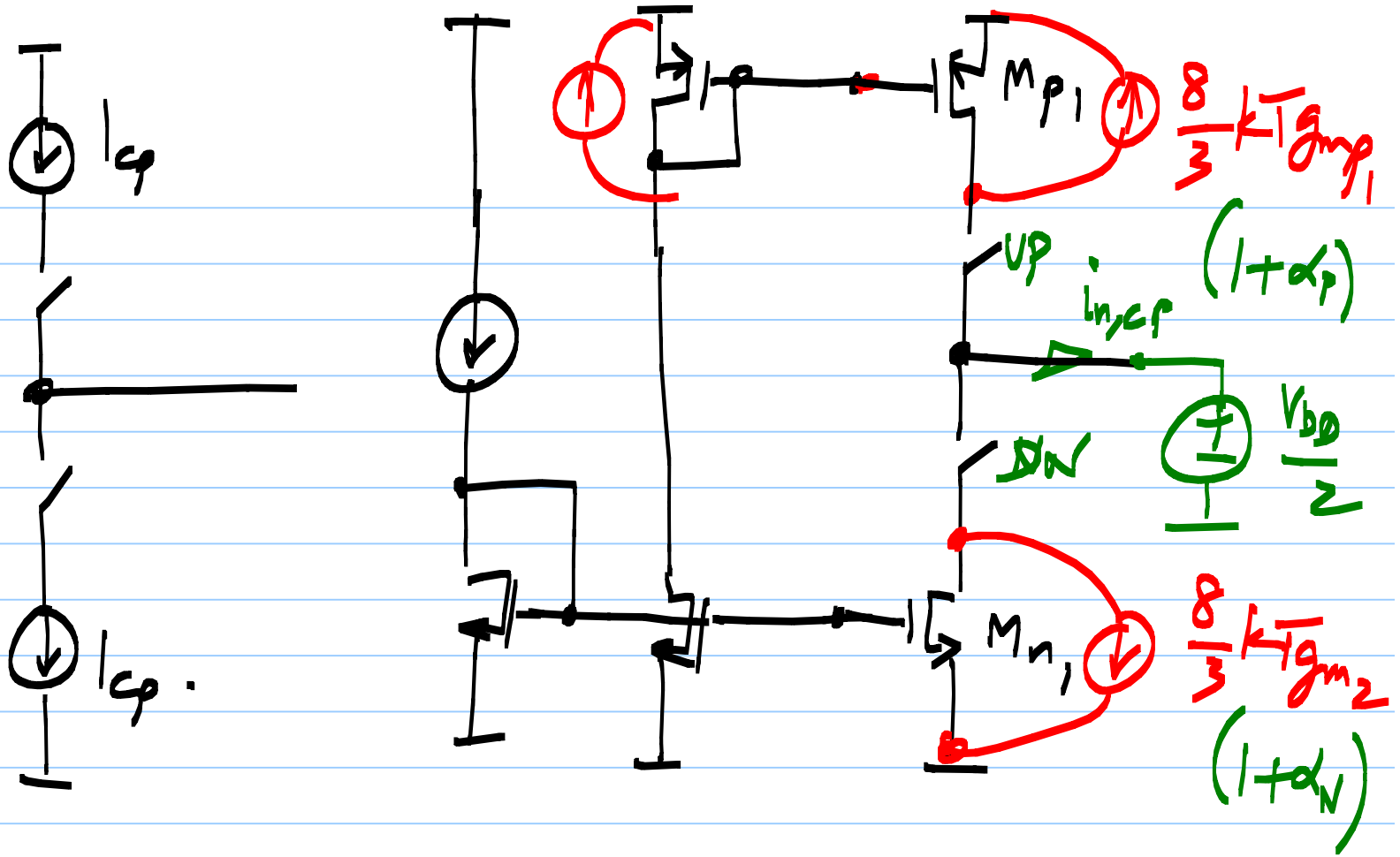
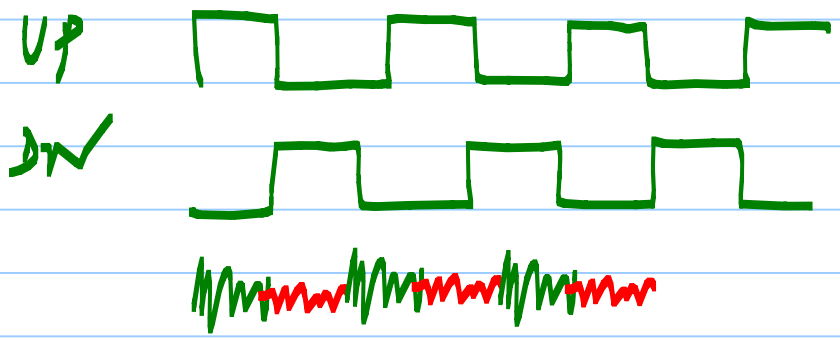
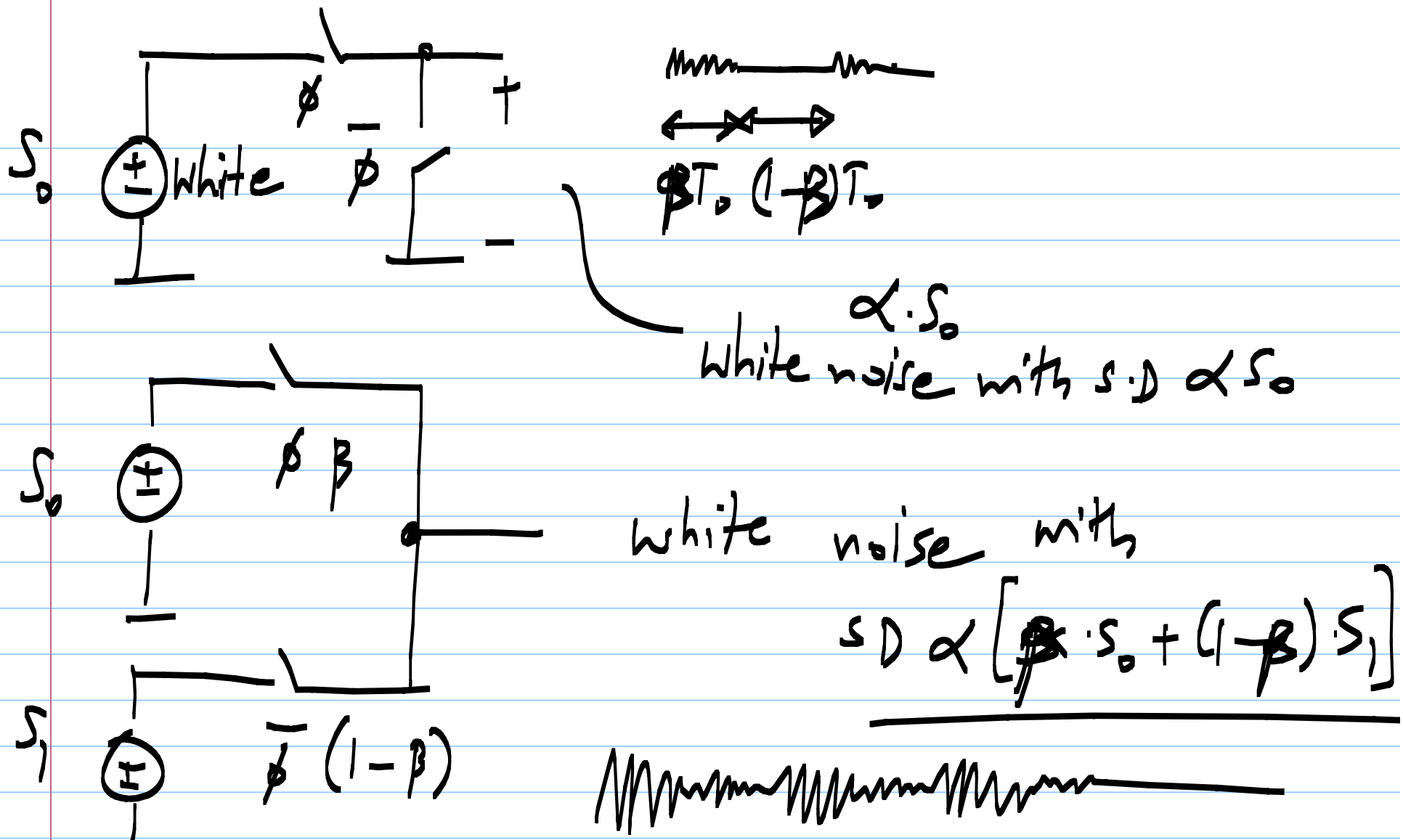
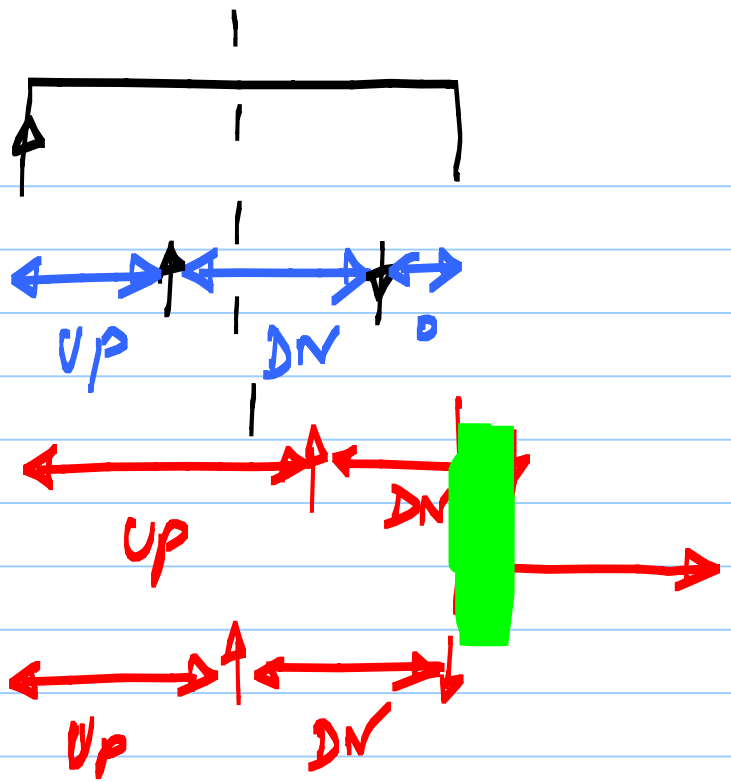


$$S_{i_{n,cp}} \left| \frac{\phi_{out}}{i_{n,cp}} \right|^2 + S_{v_{n,R}} \left| \frac{\phi_{out}}{v_{n,R}} \right|^2 + S_{\phi_{n,vco}} \left| \frac{\phi_{out}}{\phi_{n,vco}} \right|^2$$


I_{CP}
I_{CP}.
M_{P1}
M_{N1}
$\frac{8}{3}kTg_{mP1}$
$(1+\alpha_P)$
UP
$i_{n,CP}$
$\frac{V_{DD}}{2}$
DN
$\frac{8}{3}kTg_{m2}$
$(1+\alpha_N)$


UP
DN


S_0
White
ϕ
$\bar{\phi}$
βT_0 $(1-\beta)T_0$
$\alpha \cdot S_0$
White noise with s.D $\propto S_0$
S_0
ϕ β
S_1
$\bar{\phi}$ $(1-\beta)$
White noise with
s.D $\propto [\beta \cdot S_0 + (1-\beta) S_1]$


UP
DN
D
UP
DN
UP
DN

Charge pump's jitter contribution:

Charge pump's noise : white, PSD = $\alpha \cdot S_{0,cp}$

$$\frac{\alpha \cdot S_{0,cp}}{K_{pd}^2} \left| \frac{\phi_{out}}{\phi_{in}} \right|^2$$

$$= S_{0,cp} \cdot \frac{4\pi^2}{\alpha \cdot I_{cp}^2} \left| \frac{\phi_{out}}{\phi_{in}} \right|^2$$

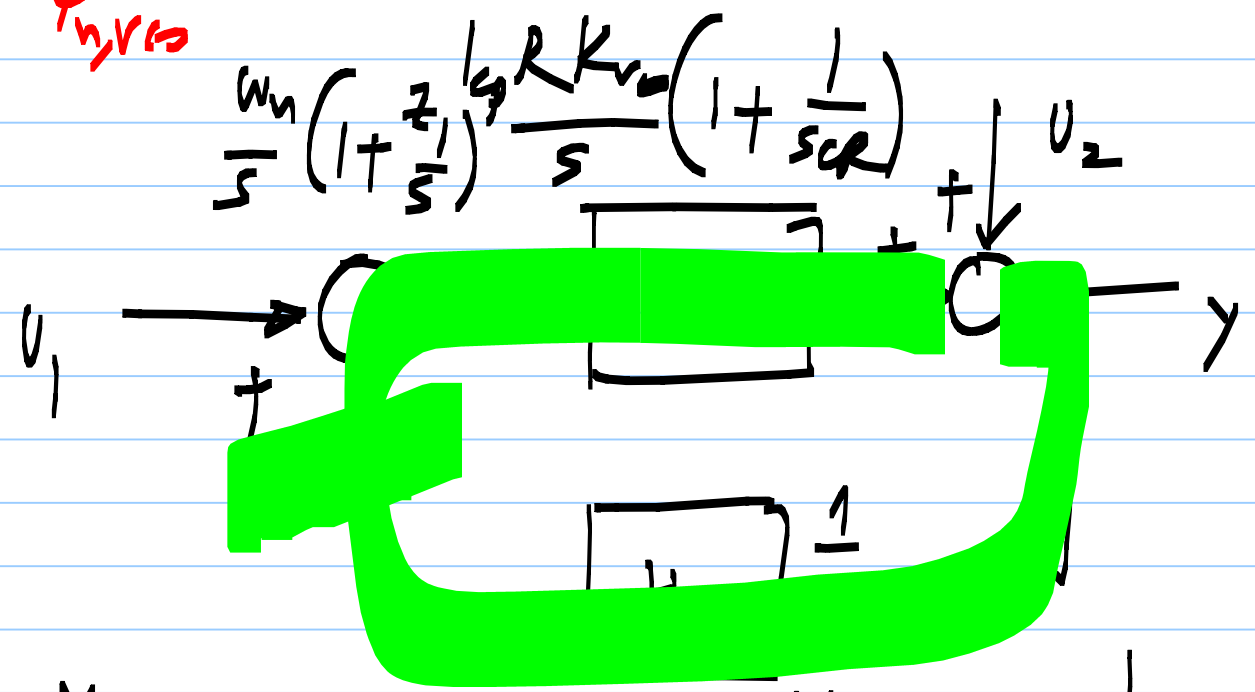
$S_{0,cp}$: one-sided

$$\int_0^\infty \cdot df$$

To plot phase noise

$$\frac{S_{0,cp}}{2} \cdot \frac{4\pi^2}{\alpha I_{cp}^2} \left| \frac{\phi_{out}}{\phi_{in}} \right|^2$$

$$\frac{\phi_{out}}{\phi_{n,ref}} =$$



$$\frac{\phi_{out}}{U_{n,R}} = \frac{\phi_{out}}{\phi_{n,ref}} \cdot \frac{2\pi K_{ref}}{s}$$

$$\frac{Y}{U_1} = \frac{G}{1+GH} \quad ; \quad \frac{Y}{U_2} = \frac{1}{1+GH}$$