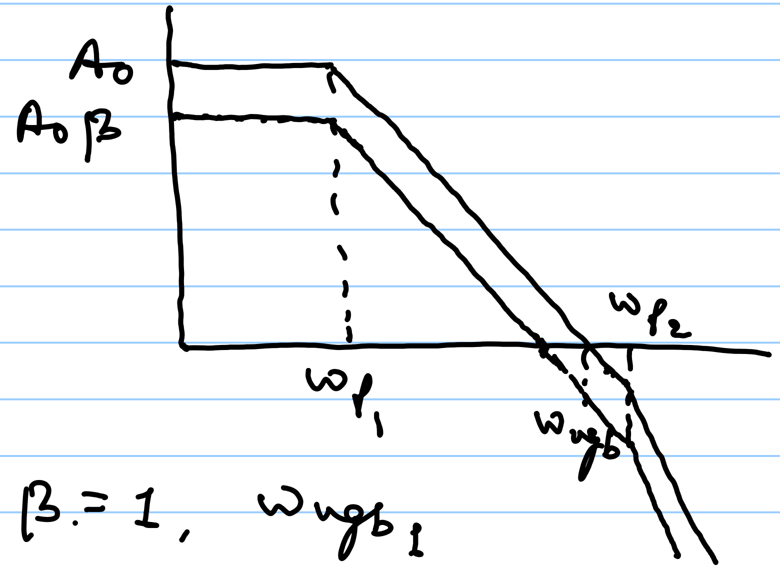
EE2019

Note Title 2/26/2019

$\beta < 1$



$A\beta < A_0$

$\omega_{p_2} > \omega_{ugb}$

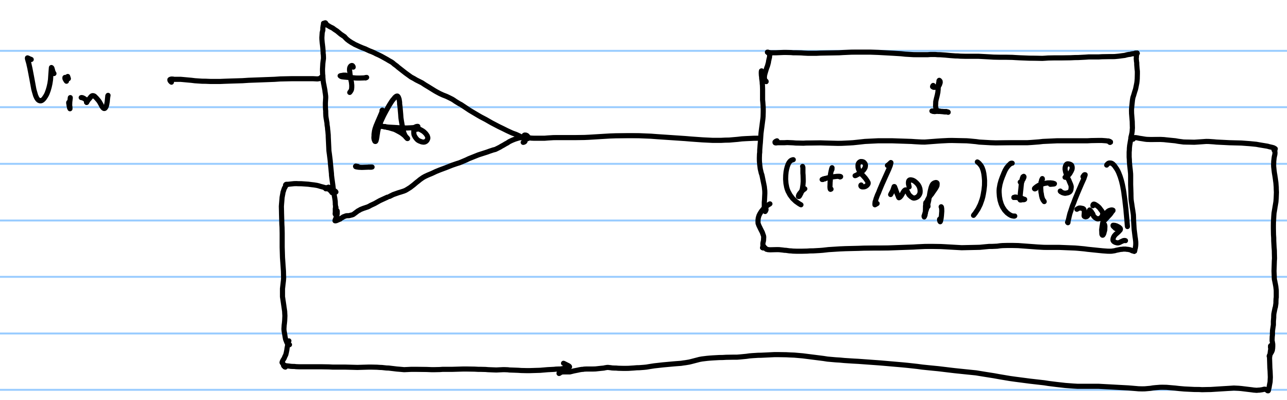
for $\beta = 1$, ω_{ugb_1}

for $\beta < 1$, ω_{ugb_2}

$\omega_{ugb_2} < \omega_{ugb_1}$

PM at $\beta < 1$ is better compared to PM at $\beta = 1$

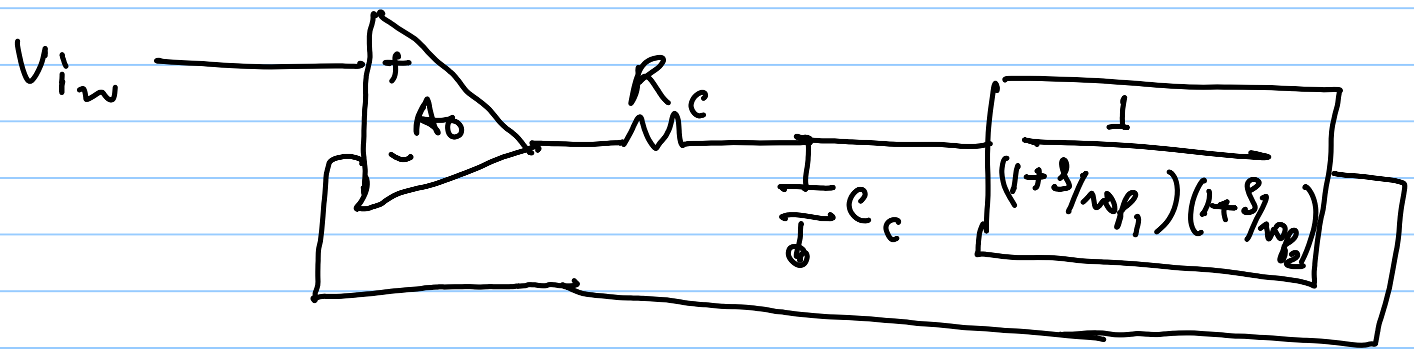
If we compensate an amplifier for $\beta = 1$ then it will be compensated for all values of $\beta < 1$.



Assumption is ω_{p_1} & ω_{p_2} can't be changed

if $\omega_{p_1} \approx \omega_{p_2}$ system is un-stable.

Introduce a 3rd pole and make it dominant



$$H_{CL}(s) = \frac{-A_0}{(1+R_cC_cs)(1+s/\omega_{p_1})(1+s/\omega_{p_2})}$$

$$\omega_c = \frac{1}{R_cC_c}$$

$$\omega_c \ll \omega_{p_1} \,\&\, \omega_{p_2} \Rightarrow \omega_{p_1} \,\&\, \omega_{p_2} > \omega_{ugb}$$

$$\omega_{ugb} = A_0 \omega_c$$

$$A_0 = 10000$$

$$\omega_{p_1}, \omega_{p_2} = 100k \text{ rad/sec}$$

$$\omega_{p_1} = \omega_{p_2} = 4 \times \underbrace{\omega_{ugb}}_{= A_0 \omega_c} = 100k$$

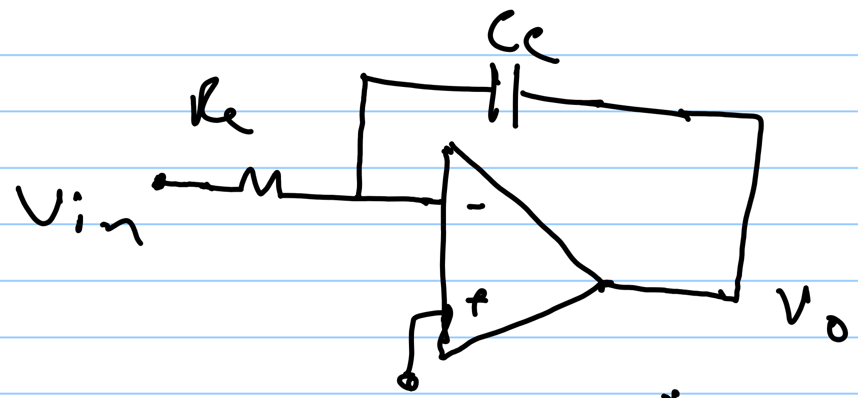
$$4 A_0 \omega_c = 100k$$

$$\omega_c = \frac{100k}{4A_0} = \frac{1}{R_c C_c} \Rightarrow C_c = \frac{4A_0}{R_c \times 100k}$$

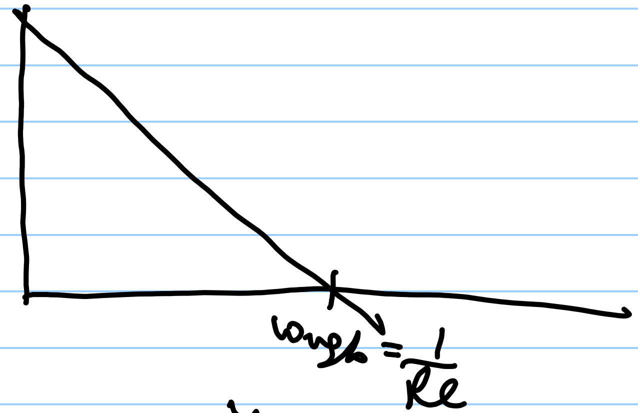
$$R_c = 1M\Omega$$

$$C_c = \frac{4 \times 10^4}{10^6 \times 10^5} = 4 \times 10^{-7}$$

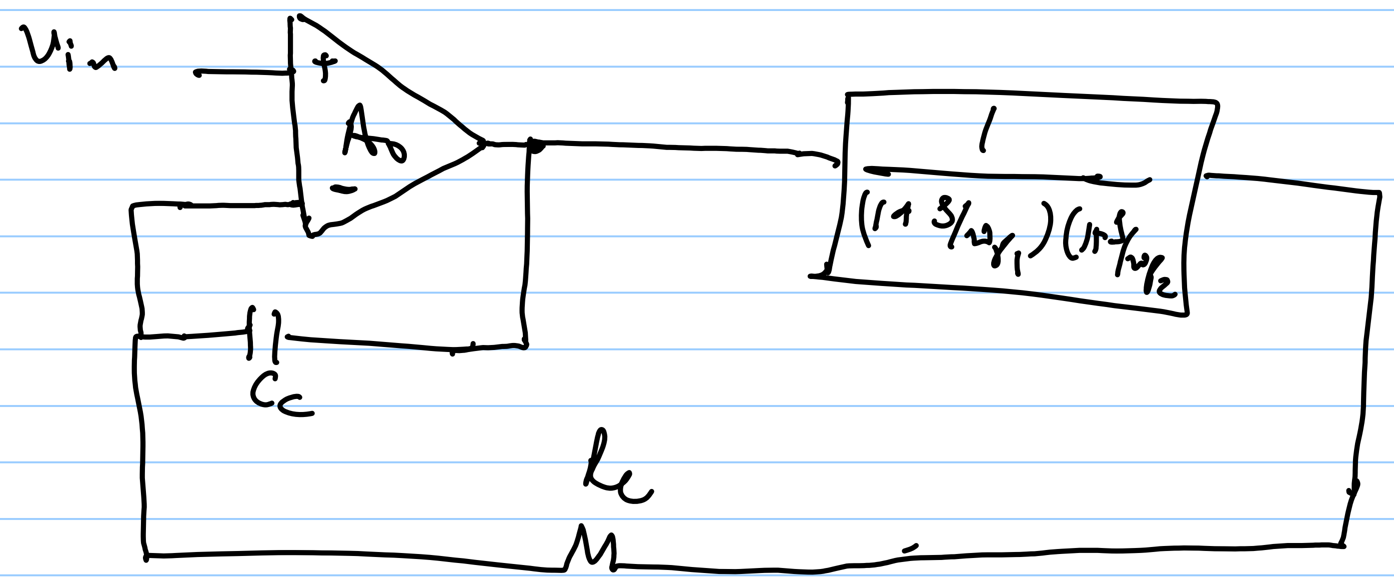
$$= 400nF$$



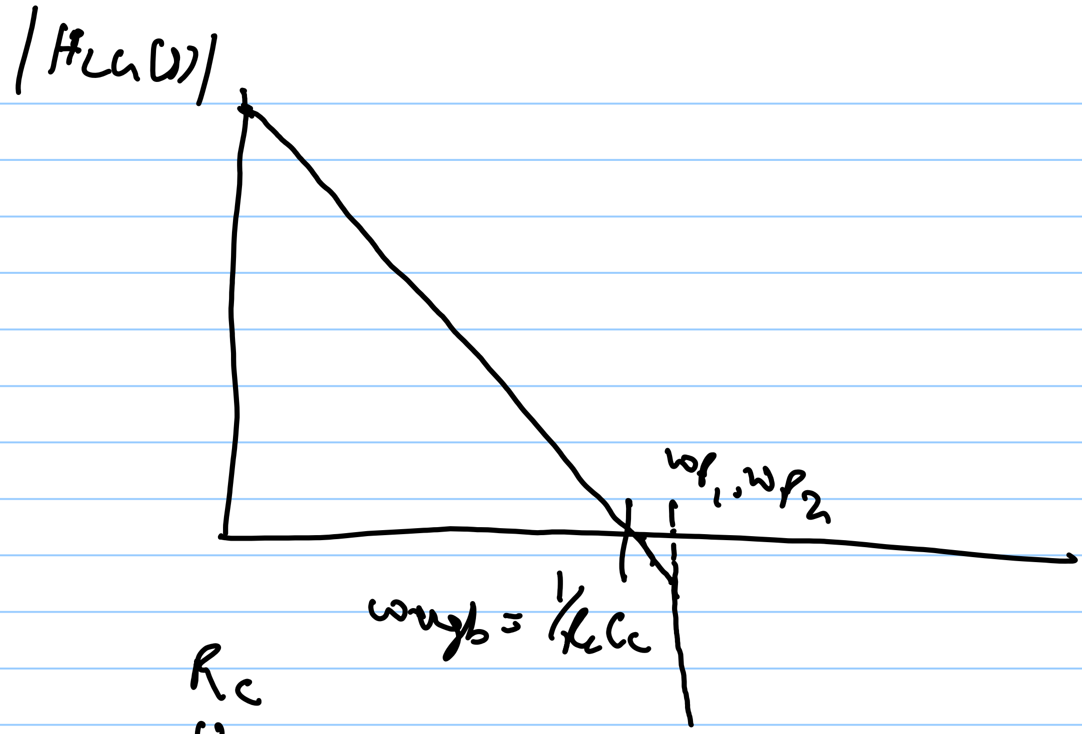
$$\omega_{ugb} = \frac{1}{R_c C_c}$$

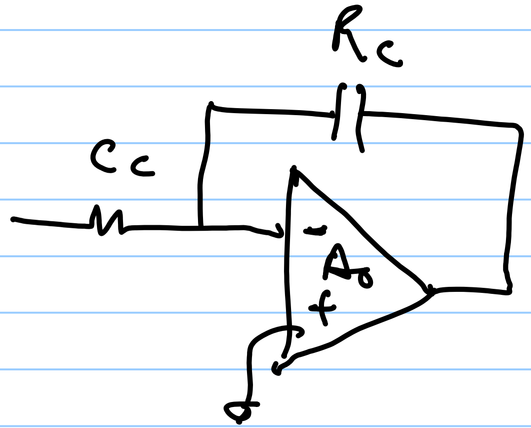


$$C_c = \frac{4}{R_c \times 100k} = \frac{4}{10^6 \times 10^5} = 4 \times 10^{-11} = 40\,pF$$



$$H_{CL}(s) = \frac{-A_0}{R_c C_c s\,(1+s/\omega_{p_1})(1+s/\omega_{p_2})} \Rightarrow \text{Integral compensation.}$$





$$\omega_p = \frac{1}{A_0 R_c C_c}$$

$\Rightarrow$