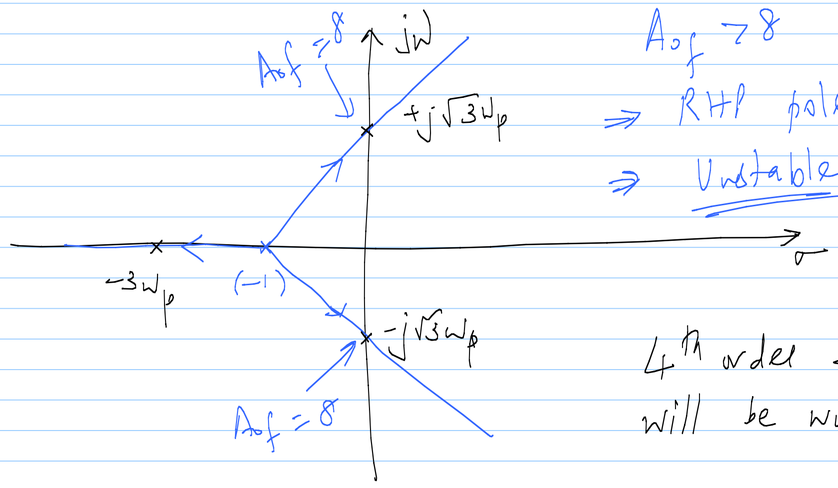
14/8/14

lec 10



$A_{of} > 8$

⇒ RHP poles

⇒ Unstable!

4^{th} order System will be worse

$A_{of} = 0 \Rightarrow$

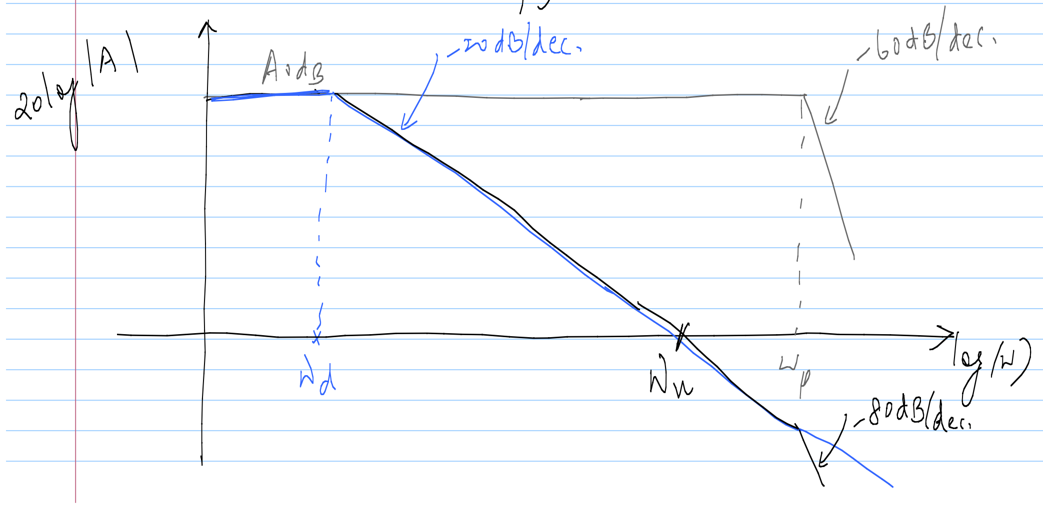
We want to make 3rd order system stable

1) $$\frac{A_0}{(1+s/\omega_p)^3} \times \frac{(1+s/\omega_z)}{(1+s/\omega_p')}$$

$\omega_z \approx \omega_p$

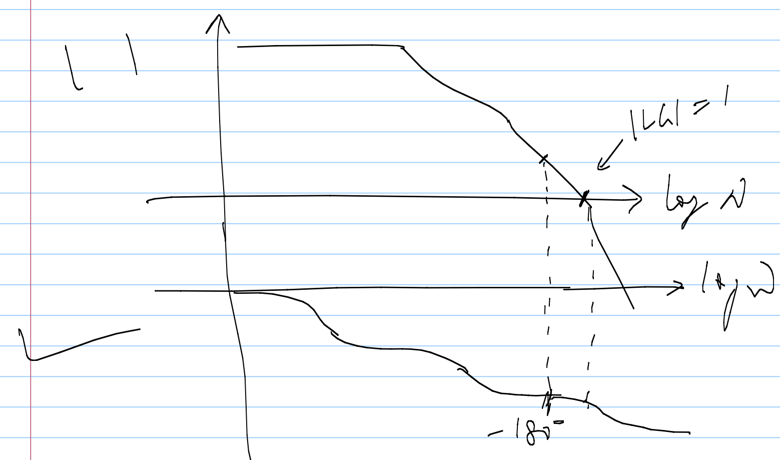
2) Make 3rd order system look like 1st order system

$$A(s) = \frac{A_0}{\left(1+\frac{s}{\omega_d}\right)\left(1+\frac{s}{\omega_p}\right)^3} \; ; \; \frac{A_0}{1+s/\omega_d} \; ; \; \frac{A_0}{(1+s/\omega_p)^3}$$

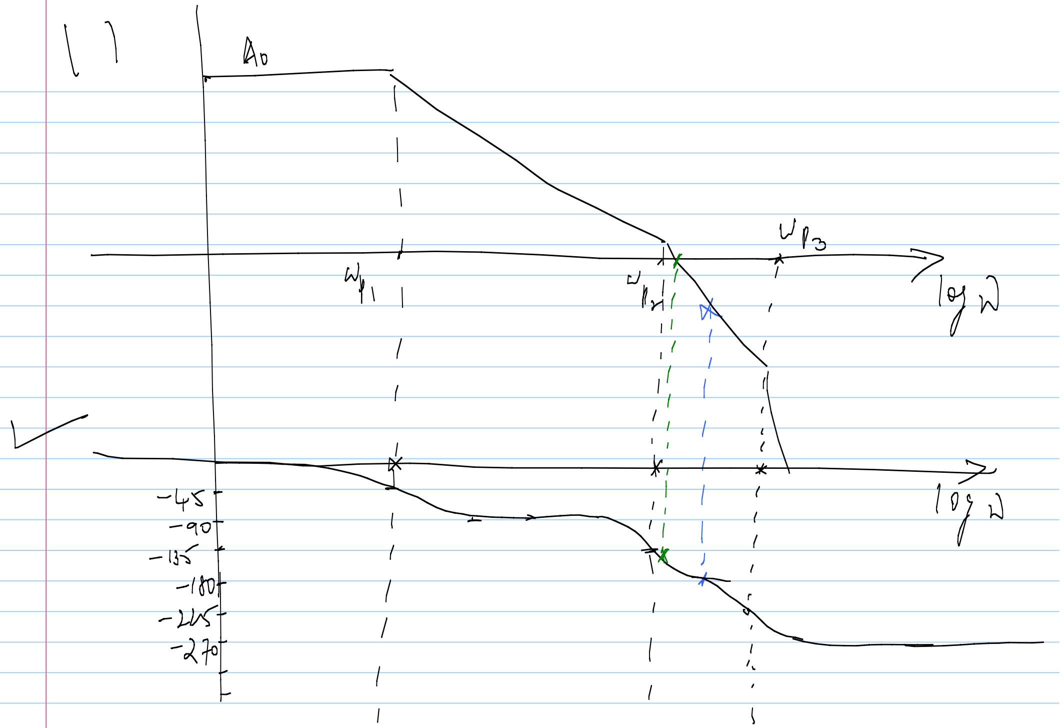


@ $\angle LG = -180°$ make $|LG| < 1$

$\equiv$ @ $|LG| = 1$, $\angle LG > -180°$



1)



* $L_G(s) = \dfrac{A_0 f}{(1+s/\omega_p)^3}$ $\Big\}$ $A_0 f\Big|_{max} = 8$

* $L_G(s) = \dfrac{A_0 f}{\left(1+\frac{s}{\omega_p}\right)^3\left(1+\frac{1000s}{\omega_p}\right)}$; $\omega_d = \dfrac{\omega_p}{1000}$

$$CL_G(s) = \frac{1}{f}\cdot\frac{L_G(s)}{1+L_G(s)} = \frac{N(s)}{D(s)}$$

$$L_G(s) = \frac{X(s)}{Y(s)}$$

roots of $D(s)=0$ gives us the poles

$\Rightarrow$ roots of $1+L_G(s)=0$

$\Rightarrow$ roots of $X(s)+Y(s)=0$

$L_G(s) = -1$

$|L_G(s)| = 1$ plug

$\angle L_G(s) = -\pi \Rightarrow \omega_{-\pi}$