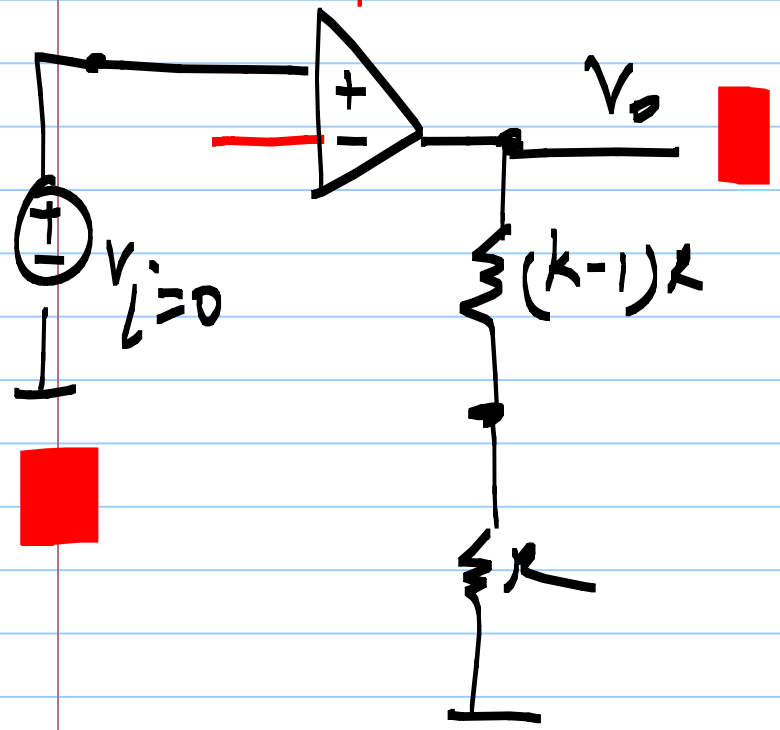
EE 209

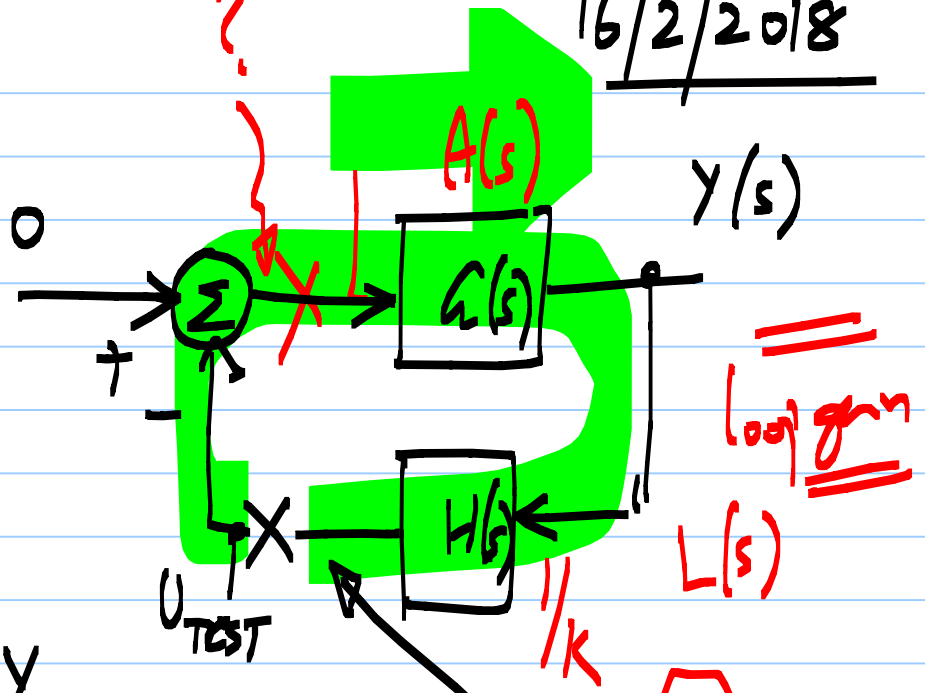
16/2/2018

Closed loop gain : $\frac{V_o}{V_i}$

Loop gain .

$G = A(s)$



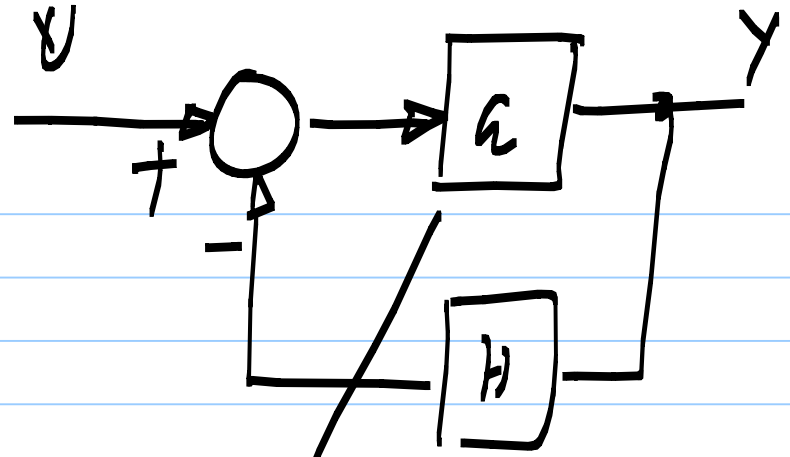


$$\frac{Y}{U} = \frac{}{1+GH}$$

$$\frac{Y}{V} = \frac{1}{1+GH}$$

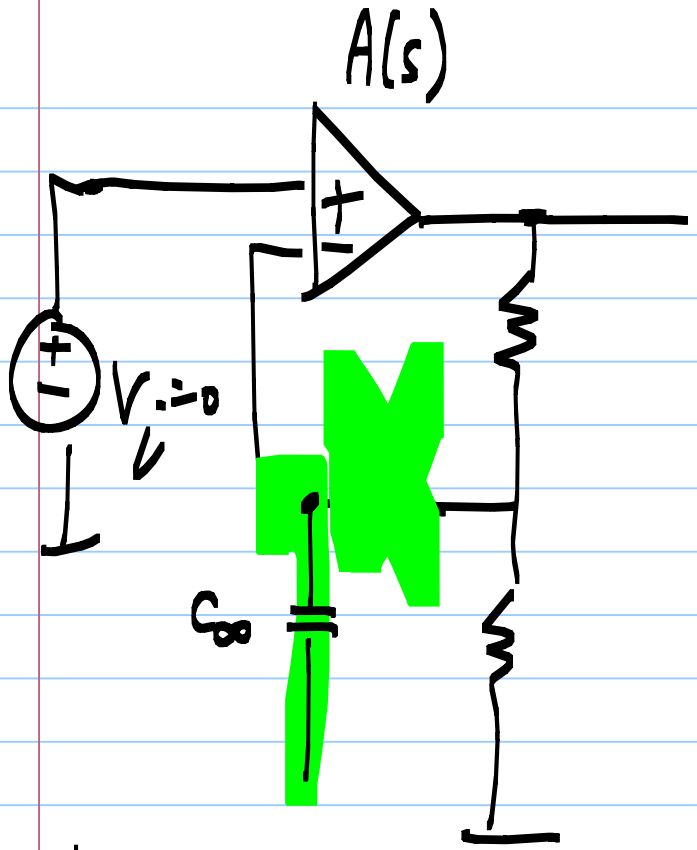
$$\frac{Y}{U} = \frac{G}{1+GH}$$

$$|GH| \gg 1 \qquad \frac{Y}{U} \simeq \frac{1}{H}$$



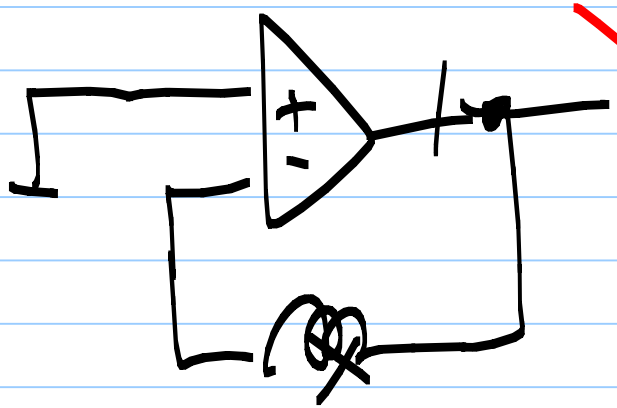
Forward path: Active device (transistor)

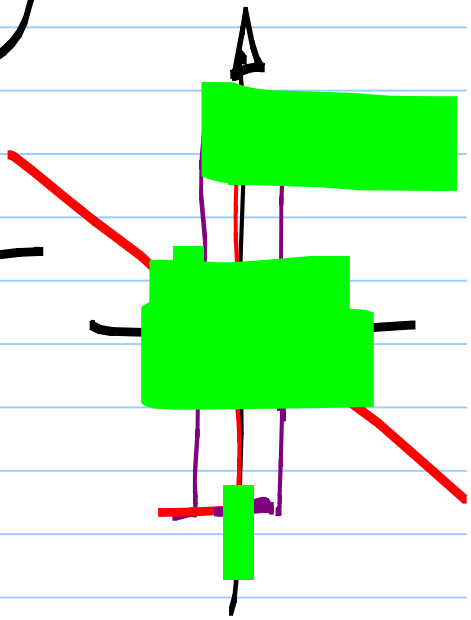
Feedback path



$$\frac{V_{RETURN}}{V_{TEST}} = \frac{A(s)}{k}$$

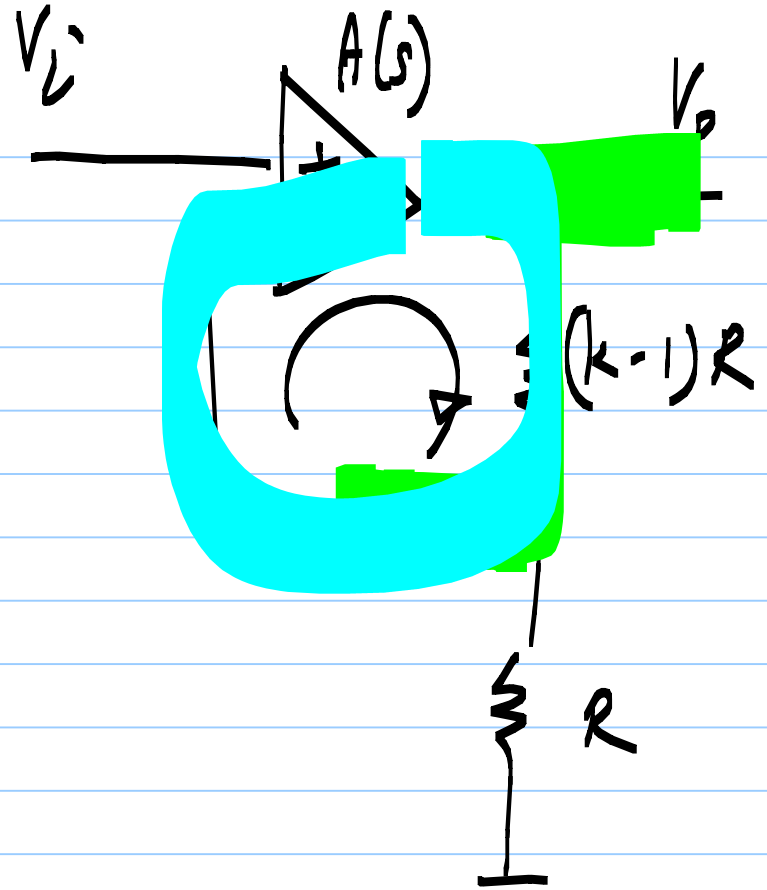
loop gain





break the loop for dc

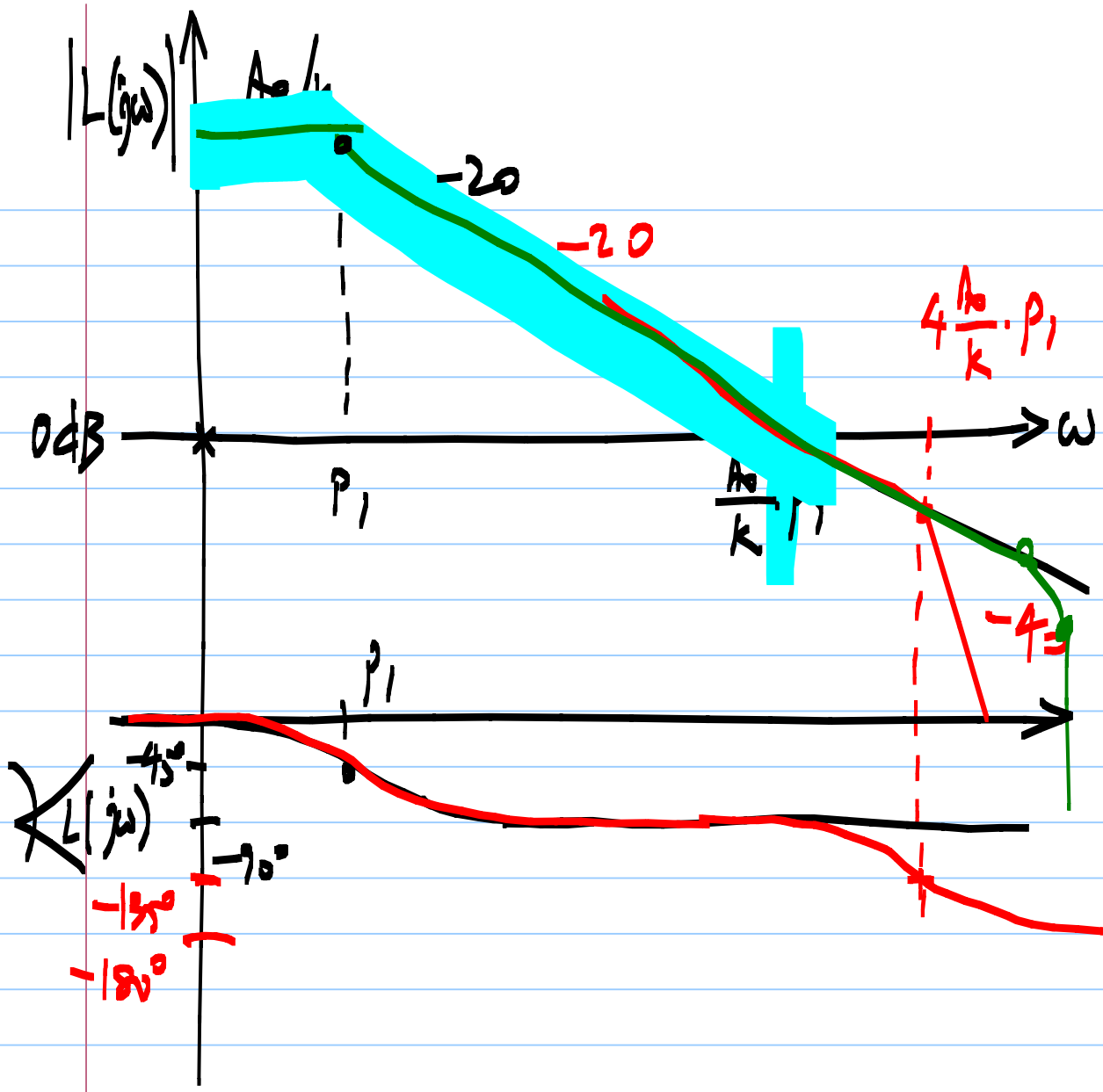
not for ac



$$L(s) = \frac{A(s)}{k}$$

$$\frac{V_o}{V_i} =$$

$$\frac{Y}{U} = \frac{G}{1+GH} =$$



1st order

$$L(s) = \frac{A_0}{k}\cdot\frac{1}{1+\frac{s}{p_1}}$$

2nd order

$$L(s) = \frac{A_0}{k}\cdot\frac{1}{\left(1+\frac{s}{p_1}\right)\left(1+\frac{s}{p_2}\right)}$$

$\zeta = 1$ $\quad \frac{p_2}{p_1} = 4\left(\frac{A_0}{k}+1\right)$

3rd order:

$$L(s) = \frac{A_0}{k} \frac{1}{\left(1+\frac{s}{p_1}\right)^3}$$

Poles of $\frac{V_o}{V_i}$ on $j\omega$ axis

for $\frac{A_0}{k} = 8$