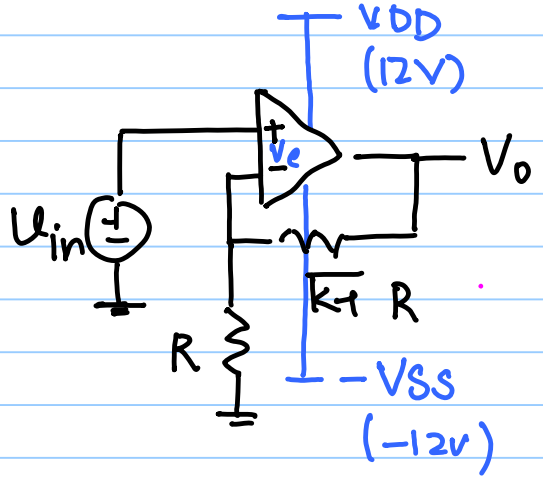
Lecture #8

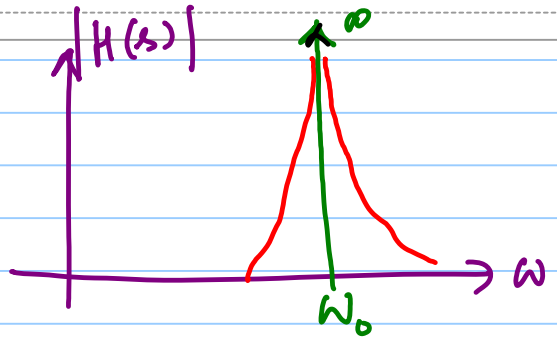
Note Title 29-01-2020



$$\frac{V_o}{V_e} = \frac{G_m}{sC} = H(s)$$

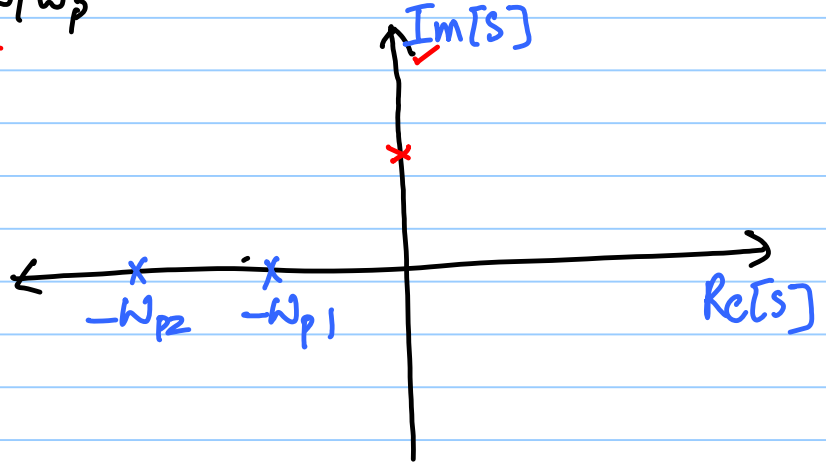
$$H(s) = \frac{1}{1+s/\omega_p} = \frac{N(s)}{D(s)}$$

$$|H(j\omega_p)| = \frac{1}{1+j\omega/\omega_p}$$



$$V_o = A_o V_e$$

$$H(s) = \frac{N(s)}{D(s)} = \frac{(1+s/\omega_{z1})(1+s/\omega_{z2})}{(1+s/\omega_{p1})(1+s/\omega_{p2})}$$



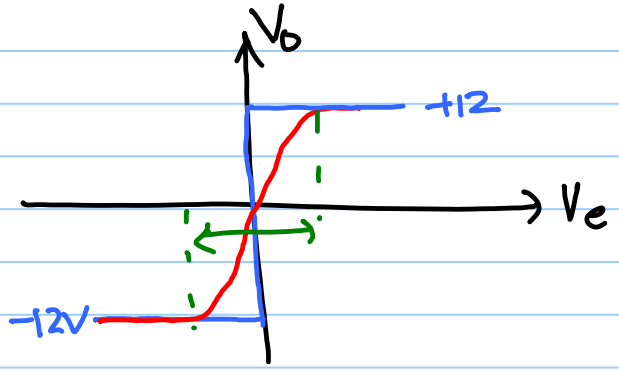
$D(s) = 0$

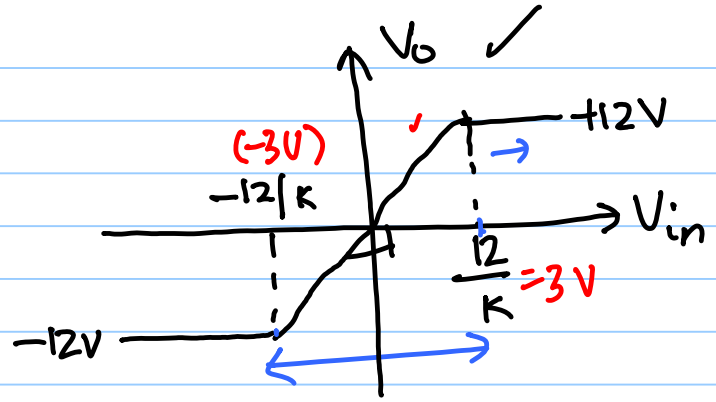
$s = -\omega_{p1}, -\omega_{p2}$

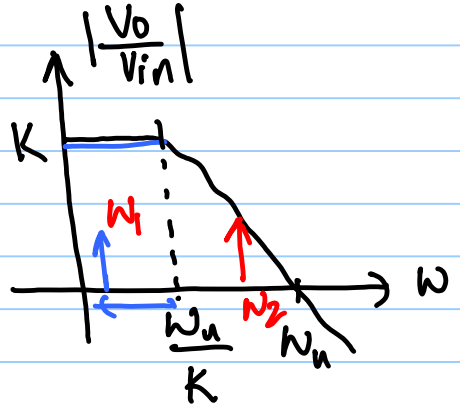
$s = j\omega$

$D(j\omega_o) = 0$

$D(s) = 1 + js/\omega_o$, $D(s) = \frac{s^2}{\omega_o^2} + 1 = 1 + s^2 LC$







$K = 4$

if $0 < w_{in} < \frac{w_u}{K}$

Gain for w_2 < Gain for w_1

$V_{in} = a\sin(w_1 t)$

$V_o = K.a\sin(w_1 t)$

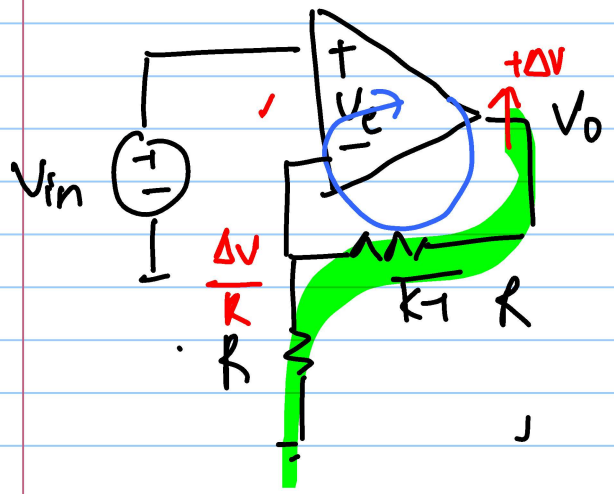
$K.a < 12V$

$a < 3v$

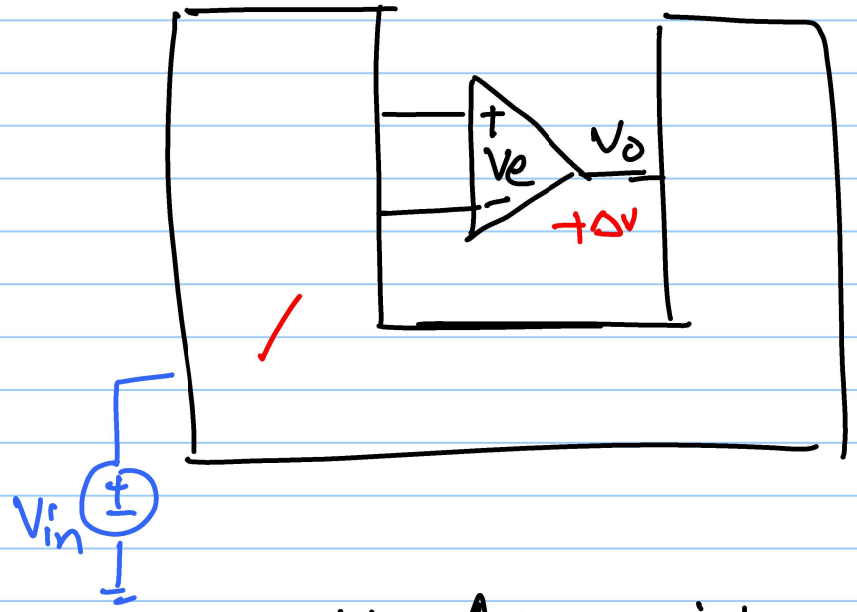
$V_{in} = b\sin(w_2 t)$

$V_{out} = k_1 \times b \sin(w_2 t)$

$k_1 < K \Rightarrow b <$



$$V_e \downarrow = V_{in} - \frac{V_o \uparrow}{K}$$



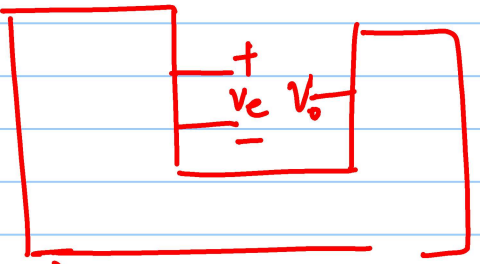
$\int$ $V_o = A V_e$

$$V_e = V_{in} - \frac{V_o}{K}$$

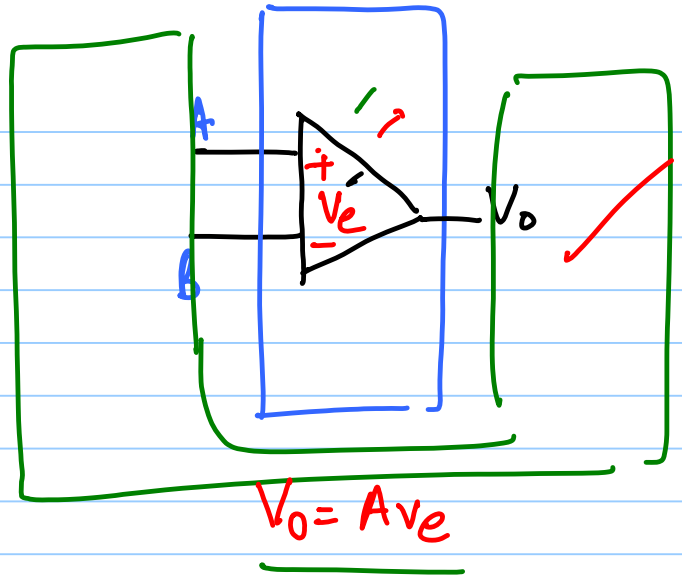
Large V_{in} → V_e Large → $V_o \uparrow$ → $V_e \downarrow$

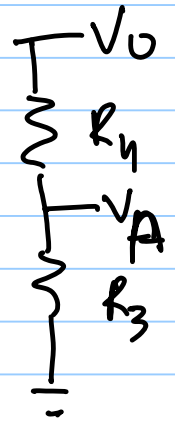
$V_o = A V_e$ independent of feedback

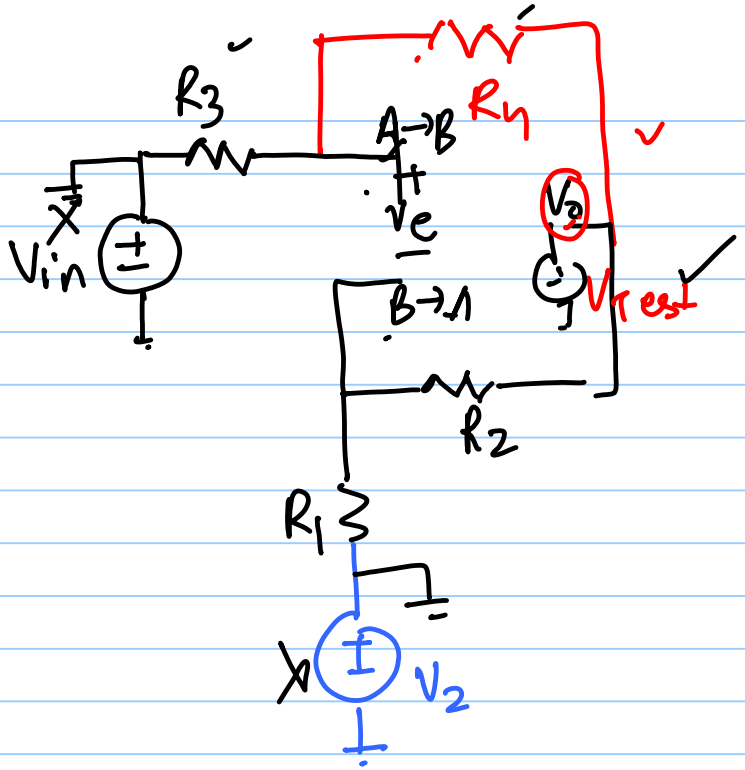
$$V_e = \alpha V_{in} + \beta V_o$$

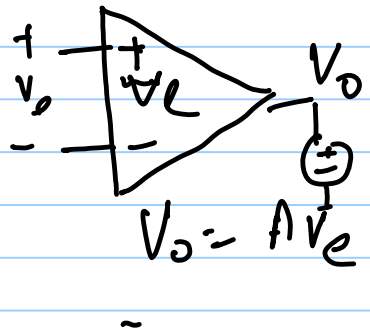


$V_o = f(V_e)$









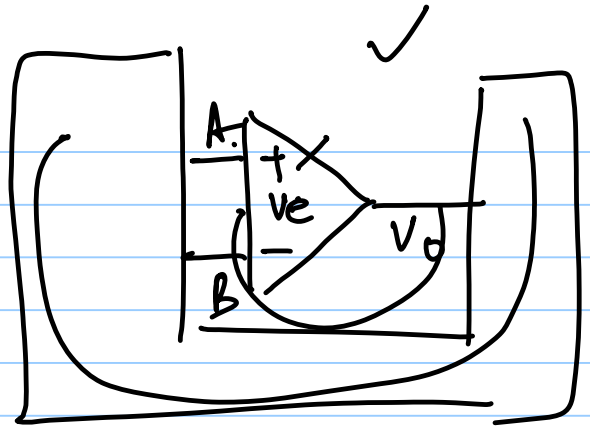
$$V_e = f(V_o) = V_A - V_B$$

$$= V_o \cdot \frac{R_3}{R_3+R_4} - \frac{R_1}{R_1+R_2} V_o$$

$$= V_o \left[\frac{R_3}{R_3+R_4} - \frac{R_1}{R_1+R_2} \right]$$

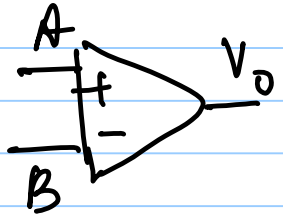
$\beta > 0$ ✓

$\beta < 0$



$V_0 = A v_e$

=



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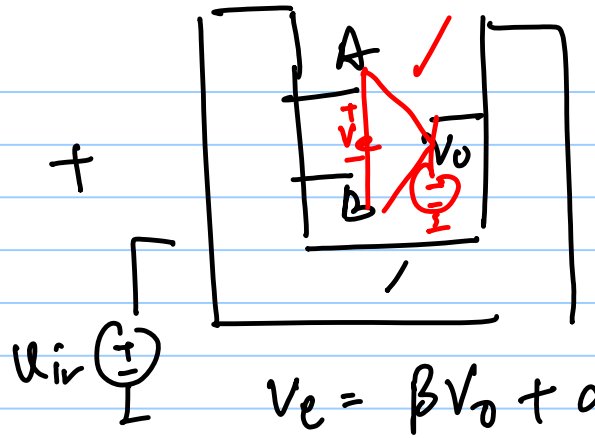
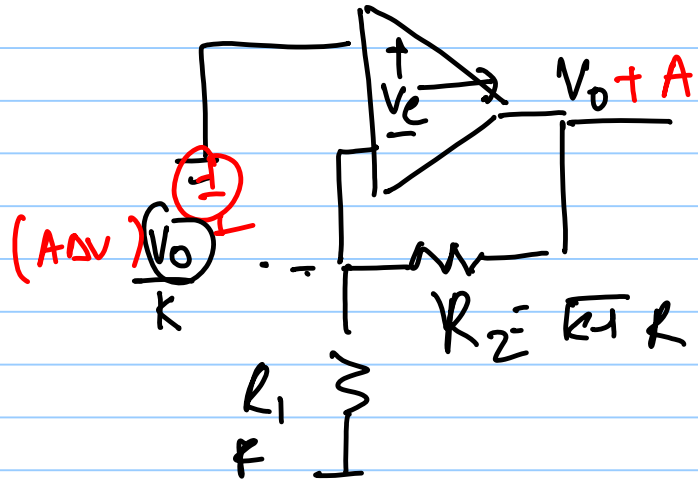


$V_e = \beta V_0 + \alpha V_{in}$

$\beta < 0$

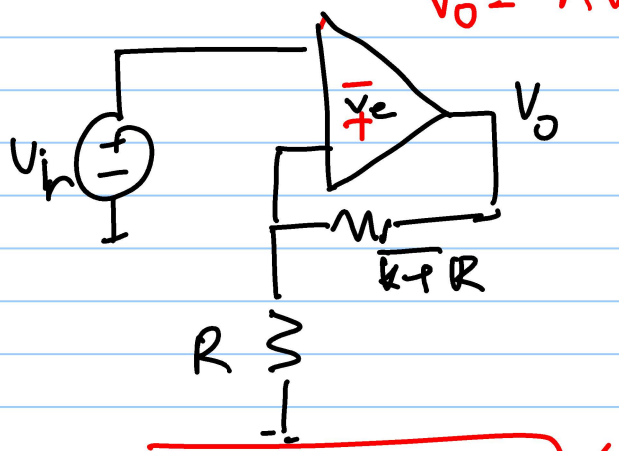


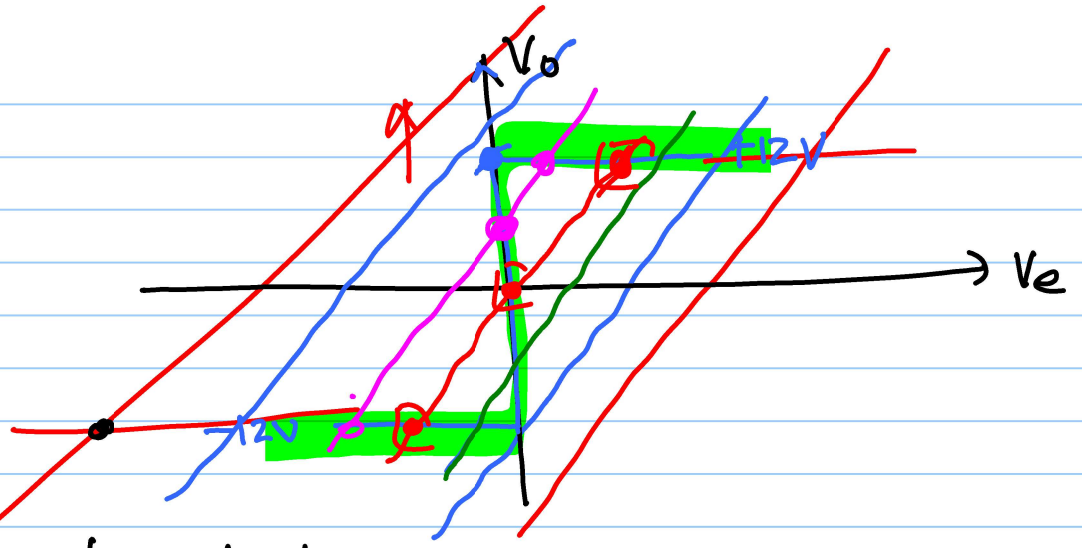
$V_e = 0 - \frac{V_0}{K}$

$V_0 = A v_e = A \cdot \left(-\frac{V_0}{K}\right)$

$V_0 =$

$V_o = AV_e$





$$V_e = \frac{V_o}{k} - V_{in}$$ (depends only on feedback net.)

$V_o = AV_e$ (depends only on amp.)

$$V_e = \frac{V_o}{k}$$

$$V_e = \frac{V_o}{4} - 3$$

$$V_e = \frac{V_o}{4} + 3$$

$V_o = -12\,V$

$V_{in} > +3V \Rightarrow V_o = -12V$

$V_{in} < -3V \Rightarrow V_o = +12V$