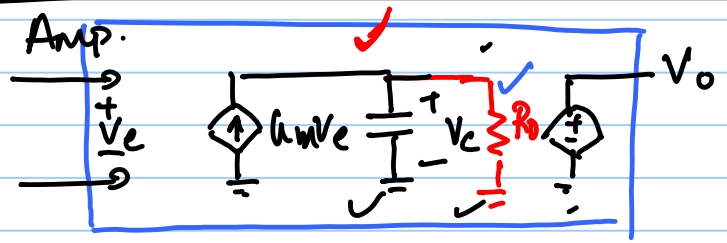
Note Title

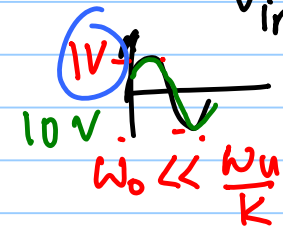
Lecture #7.

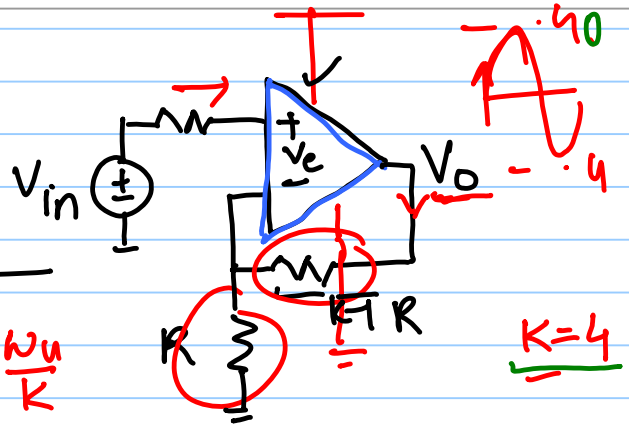
28-01-2020

Ideal Amp.



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





$$\frac{V_o}{V_{in}} =$$

$$\frac{V_o(s)}{V_e(s)} =$$

$$V_o(s) = G_m V_e \times \left(R_o \| \frac{1}{sC}\right)$$

$$\frac{V_o}{V_e} = \frac{G_m R_o}{1 + s R_o C} = \frac{1}{\frac{1}{G_m R_o} + \frac{sC}{G_m}}$$

$$= \frac{1}{\frac{1}{A_o} + \frac{s}{\omega_u}}$$ ✓

$$\frac{V_o}{V_{in}} =$$

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

$$V_o = \frac{1}{\frac{1}{A_o} + \frac{s}{\omega_u}} \cdot V_e$$

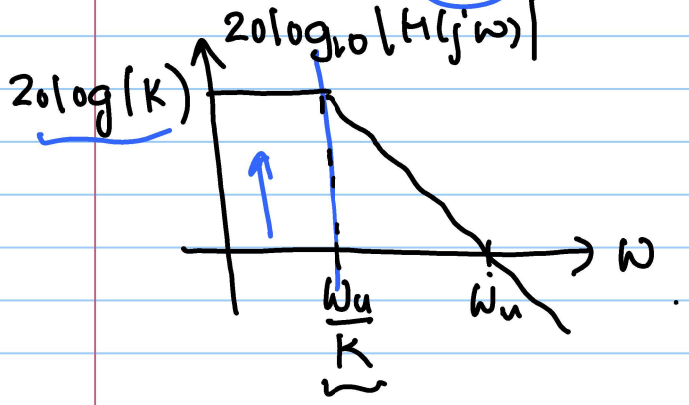
$$\frac{V_o}{V_{in}} = \frac{1}{\left\{\frac{1}{K} + \frac{1}{A_o} + \frac{s}{\omega_u}\right\}}$$

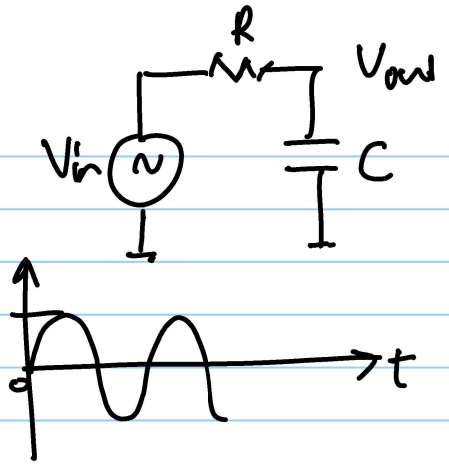
$$H(s) = \frac{V_o}{V_{in}} = \frac{1}{\frac{1}{K} + \frac{1}{A_0} + \frac{s}{\omega_u}}$$

$$\left.\frac{V_o}{V_{in}}\right|_{s=0} = \frac{K \cdot 1}{1 + \frac{K}{A_0}}$$

$$s = -\omega_u \left(\frac{1}{K} + \frac{1}{A_0}\right)$$

$$\approx -\frac{\omega_u}{K}$$

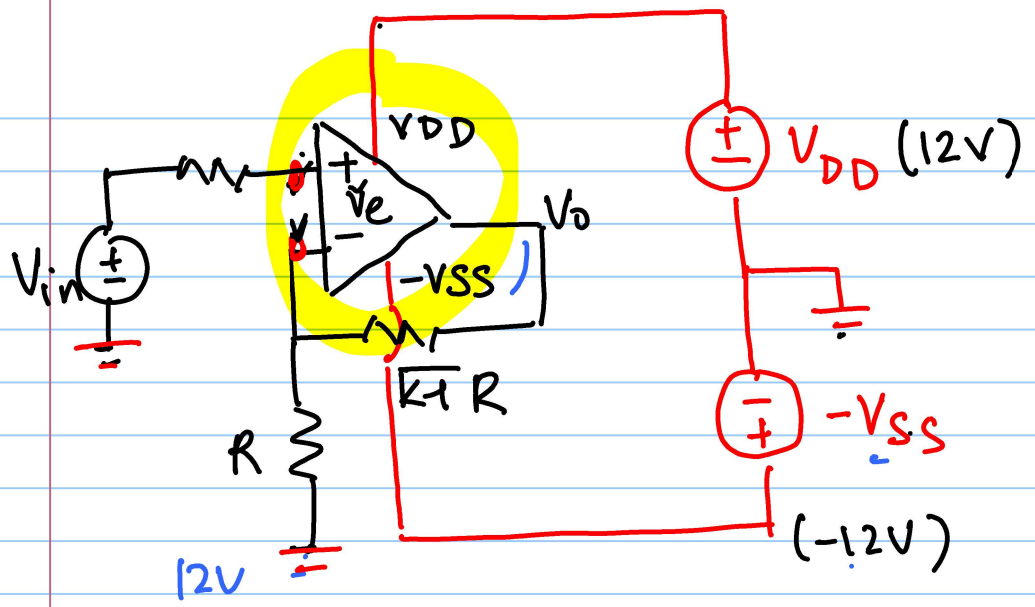


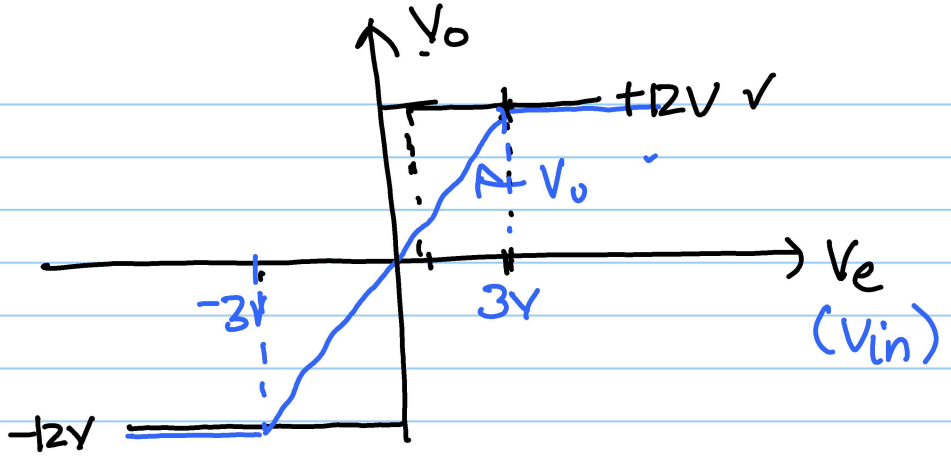


$$\frac{V_o}{V_{in}} = \frac{1}{1 + sRC}$$

$$\frac{N(s)}{D(s)} = H(s)$$

$$D(s) = 0$$

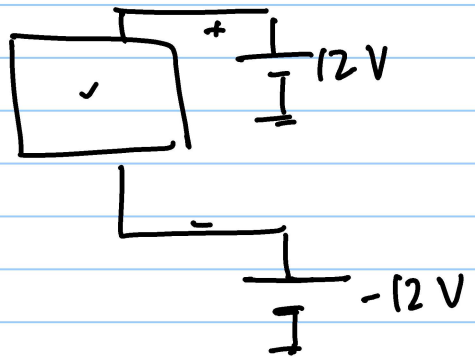




$\rightarrow V_o = A_o V_e$ ✓ if $A_o \to \infty$, $V_e = +\Delta \Rightarrow V_o \to +\infty$

$V_e = -\Delta \Rightarrow V_o \to -\infty$

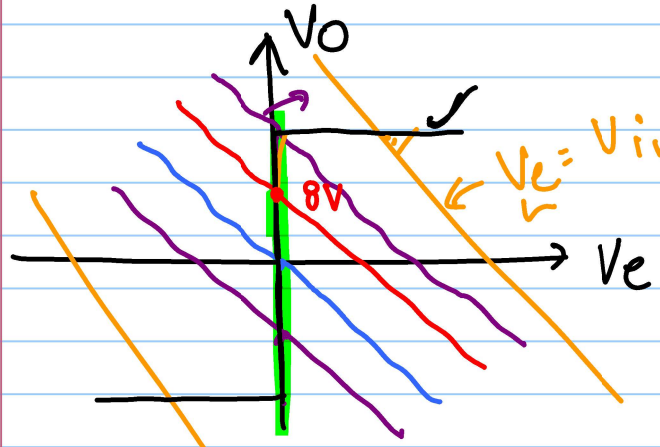
✓ $V_e = V_{in} - \frac{V_o}{K}$

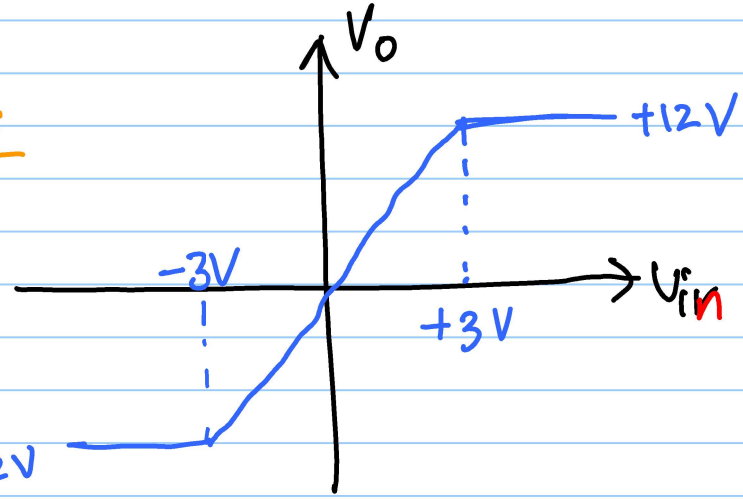


$A_o \to \infty$.

$V_o = K V_{in}$

V_{in} ? $\rightarrow$ $V_o = +12V$





$V_0 = A_0 V_e$

$V_e = V_{in} - \frac{V_0}{K}$

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

$V_e = \frac{V_{in}}{(1 + \frac{A}{K})}$

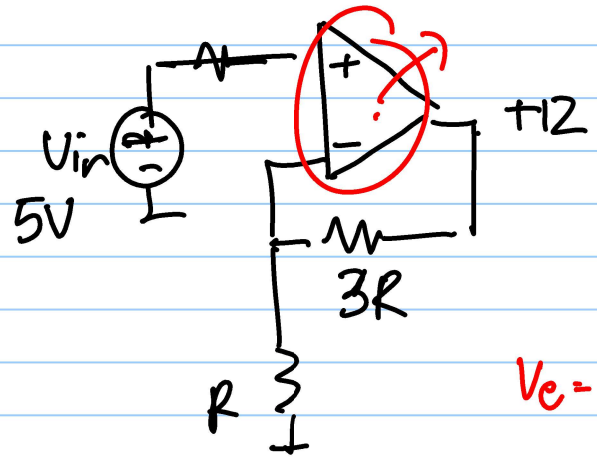
$V_0 = A_0 V_e$

$V_e = V_{in} - \frac{V_0}{K}$

$V_e = -\frac{V_0}{K}$ −

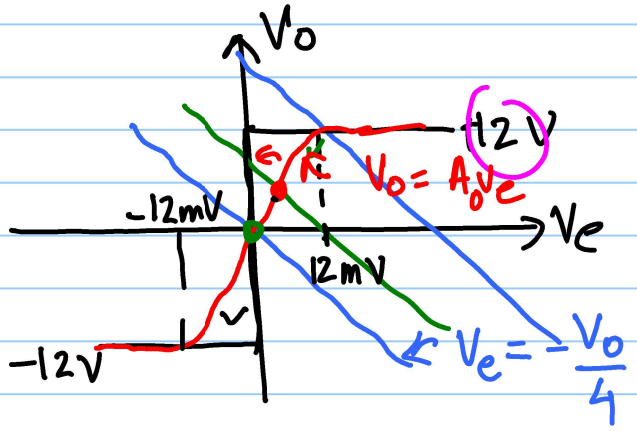
$V_{in} = +2V$

$V_e = 2 - \frac{V_0}{K}$



$V_e = 5 - \frac{12}{4}$

$V_o = A_o V_e$



$$\begin{cases} V_o = A_o V_e & \checkmark\ \checkmark \\ V_e = V_{in} - \dfrac{V_o}{K} & \checkmark \end{cases}$$

$V_e \neq 0$

$$= V_{in} - \frac{V_o}{4}$$