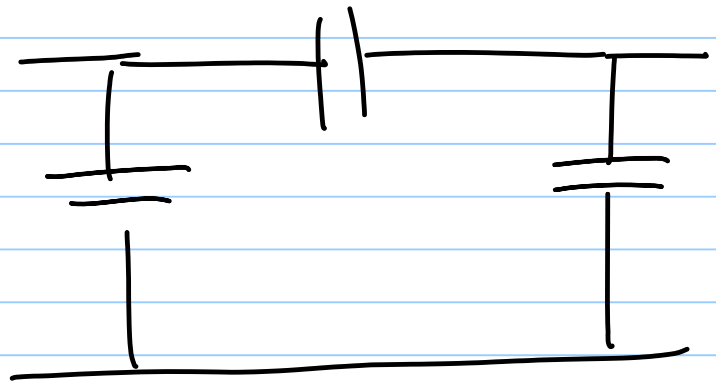
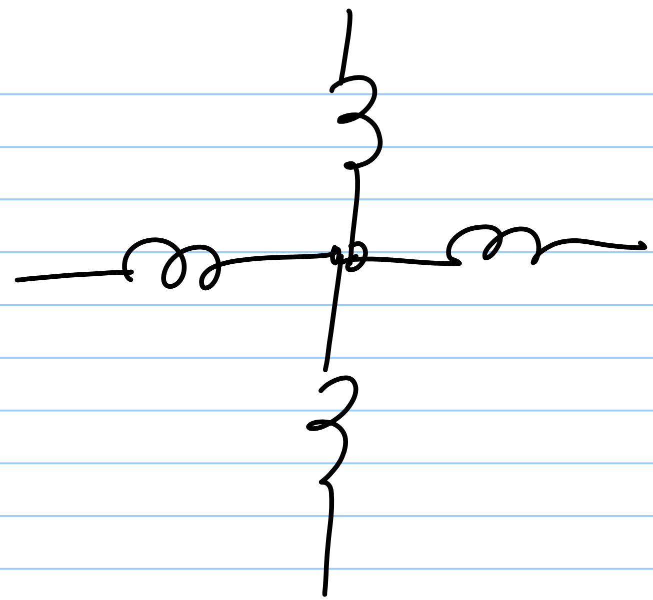
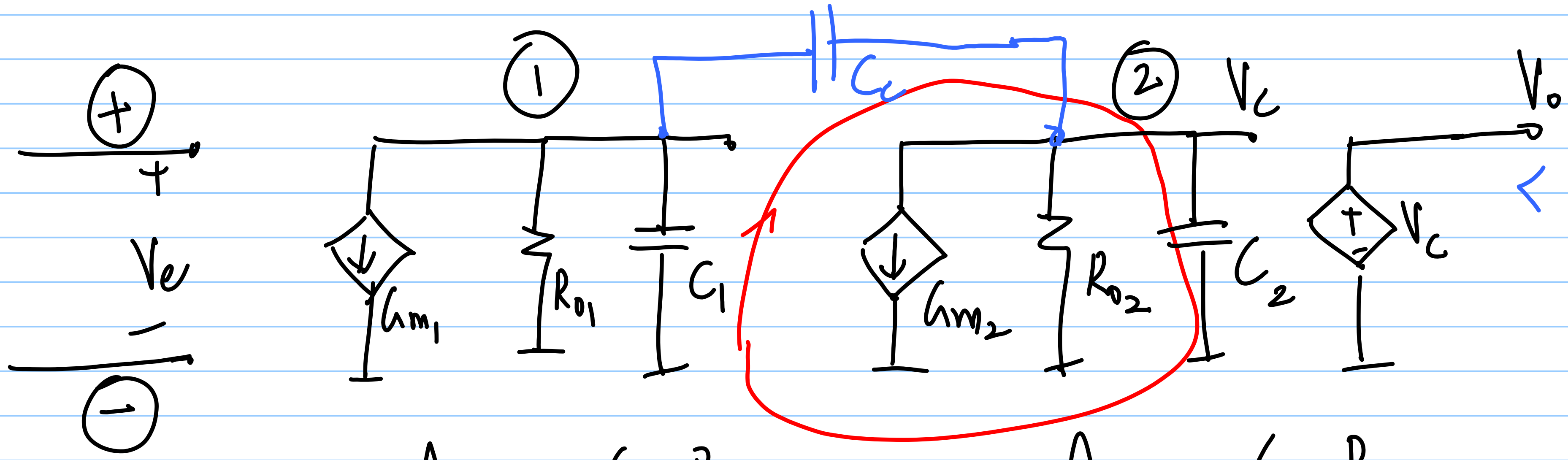
27/02/2019

Lecture 22







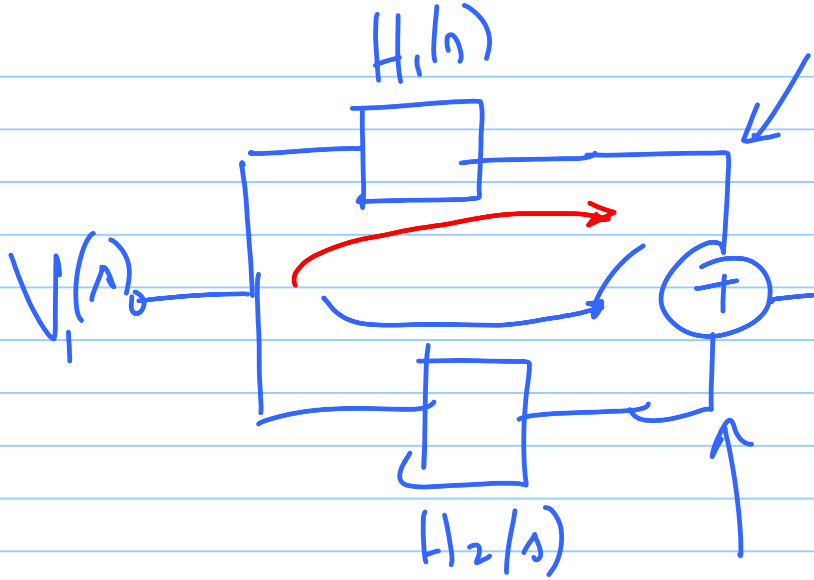
$$A_{o_1} = -G_{m_1} R_{o_1}$$

$$A_{o_2} = -G_{m_2} R_{o_2}$$

$$\frac{V_o(s)}{V_e(s)} = \frac{G_{m_1}\left(-G_{m_2}+sC_c\right)}{sC_c\left(-G_{m_2}+sC_c\right) - \left[G_{o_2}+s\left(C_2+C_c\right)\right] \cdot \left[G_{o_1} + s\left(C_1+C_c\right)\right]}$$

$$= \frac{G_{m_1}\left(G_{m_2}-sC_c\right)}{s^2\left(C_1C_c + C_2C_c + C_1C_2\right) + s\left[C_c\left(G_{m_2}+G_{o_1}+G_{o_2}\right) + C_1\cdot G_{o_2} + C_2\cdot G_{o_1}\right] + G_{o_1}\cdot G_{o_2}}$$

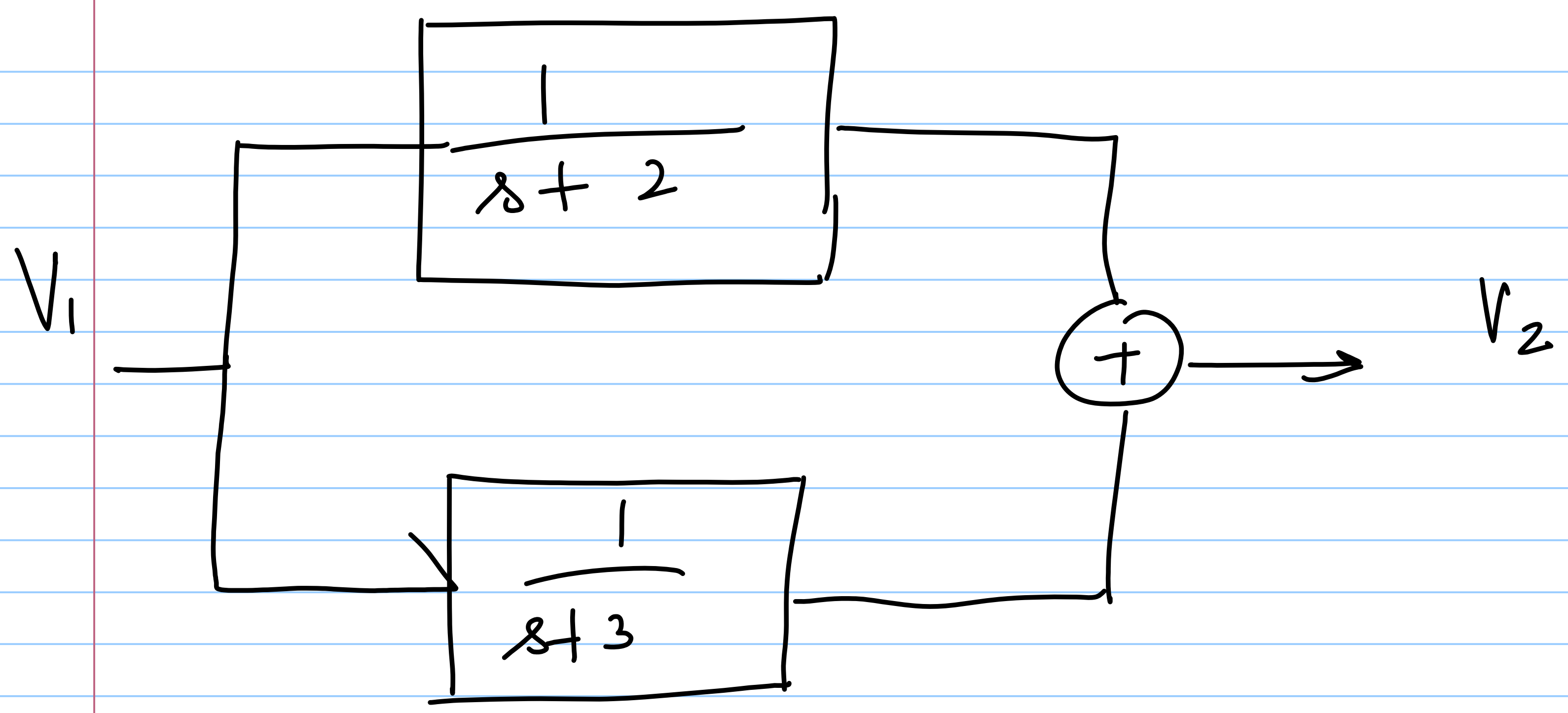
RHP zero



$$V_2(s) = \left[H_1(s) + H_2(s)\right] \cdot V_1(s)$$

$$H_1(s) = \frac{N_1(s)}{D_1(s)} \; ; \qquad H_2(s) = \frac{N_2(s)}{D_2(s)}$$

$$\frac{V_2(s)}{V_1(s)} = \frac{N(s)}{D(s)}$$



$$\frac{V_2(s)}{V_1(s)} = \frac{2s+5}{(s+2)(s+3)}$$

$$\frac{V_o(s)}{V_e(s)} = A_o \frac{(1 - s/z)}{(1+s/p_1)(1+s/p_2)} \qquad p_1 \ll p_2$$

$$= \frac{G_{m1} G_{m2}}{G_{o1} G_{o2}} \cdot \frac{\left(1 - \frac{sC_c}{G_{m2}}\right)}{1 + s\left[\frac{C_1}{G_{o1}} + \frac{C_2}{G_{o2}} + \frac{C_c}{G_{o1}}\left(1 + \frac{G_{o1}}{G_{o2}} + \frac{G_{m2}}{G_{o2}}\right)\right] + \frac{s^2}{G_{o1}G_{o2}}\left(C_1C_c + C_2C_c + C_1C_2\right)}$$

$$z = +\frac{G_{m2}}{C_c}$$

$$as^2 + bs + c$$

$$p_1 \approx -\frac{c}{b}$$

$$p_2 \approx -\frac{b}{a} \checkmark$$

$$p_1 \approx \frac{-G_{o1}}{C_c\left(\frac{G_{m2}}{G_{o2}} + \frac{G_{o1}}{G_{o2}} + 1\right) + C_1 + \frac{C_2}{G_{o2}} \cdot G_{o1}} \approx \frac{-G_{o1}}{C_c \cdot \left(\frac{G_{m2}}{G_{o2}}\right)}$$

Miller capacitance