

15/10/19

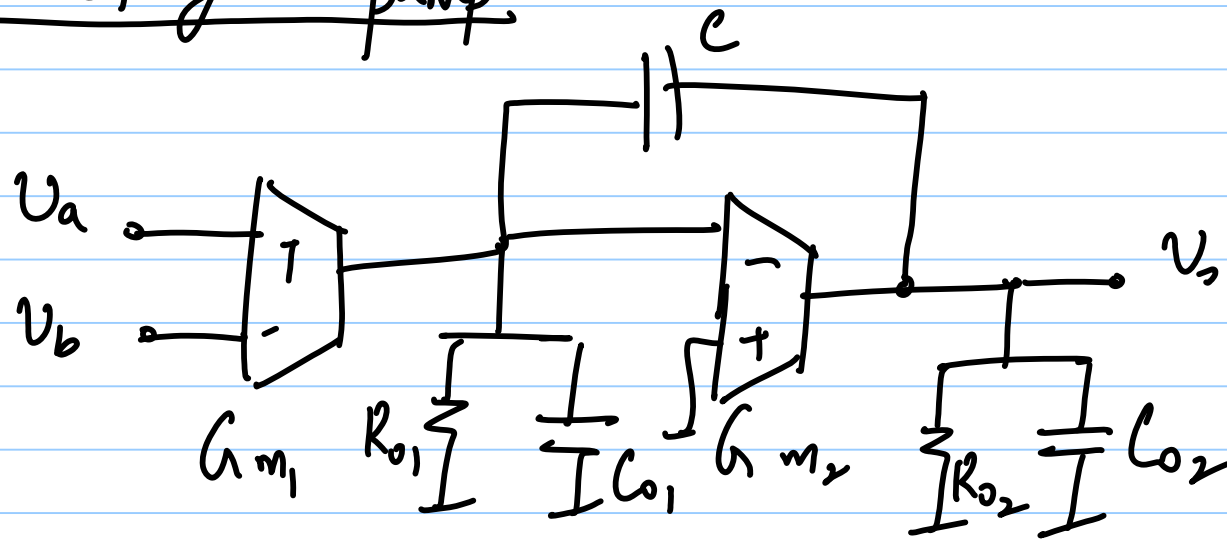
Lec 28

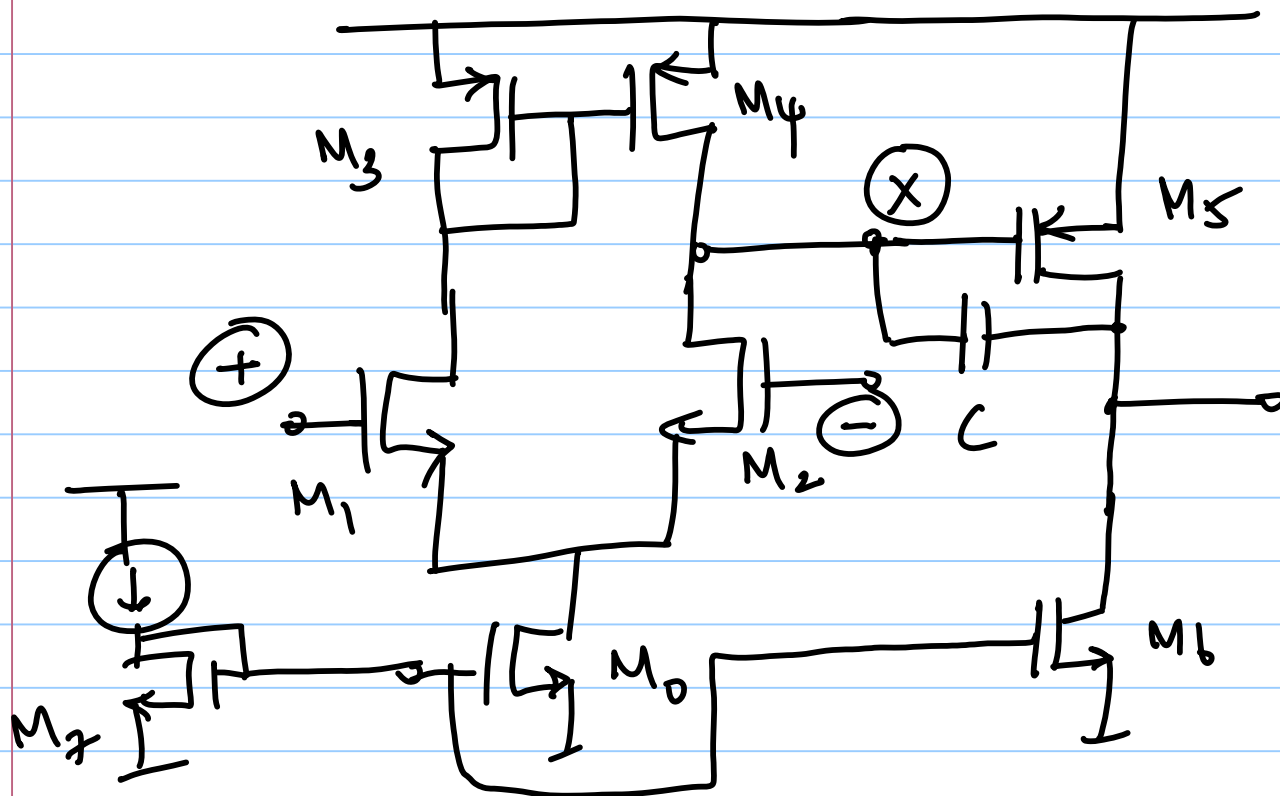
1- stage opamp

$$\frac{V_o}{V_i} = \frac{g_{m1}}{2g_o} \cdot \frac{1 + \frac{sC_2}{2g_{m3}}}{\left(1 + \frac{sC_L'}{g_o}\right) \left(1 + \frac{sC_2}{g_{m3}}\right)}$$

$$\omega_d = -\frac{g_o}{C_L'} ; \quad \omega_{nd} = -\frac{g_{m3}}{C_2} ; \quad \omega_z = -\frac{2g_{m3}}{C_2}$$
$$|\omega_z| = 2 |\omega_{nd}|$$

2-stage opamp





$$G_{m1} = g_{m1}$$

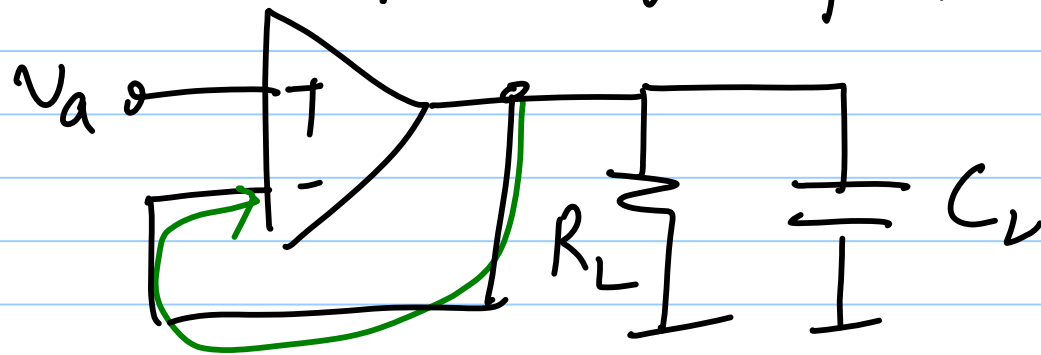
$$G_{m2} = g_{m5}$$

$$R_{o1} = r_{ds2} || r_{ds4}$$

$$R_{o2} = r_{ds5} || r_{ds6}$$

$$\omega_d \approx \frac{g_{m1}}{g_{m5} R_{o2} \cdot C}$$

- 2-stage opamp



DC gain: $g_{m1} R_{o1} \cdot g_{m5} (R_{o2} \parallel R_L)$

$\underbrace{g_{m1} R_{o1}}_{\text{gives large enough gain}} \cdot \underbrace{g_{m5} (R_{o2} \parallel R_L)}_{\approx g_{m5} R_L}$