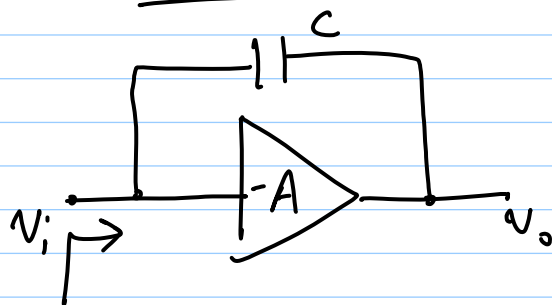
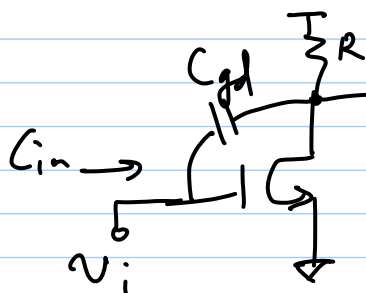


22-1-13

Lec 5



$$C_{in} = (1+A)C \quad \text{Miller Effect}$$

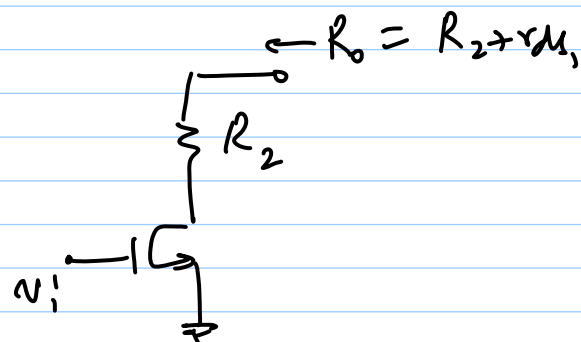
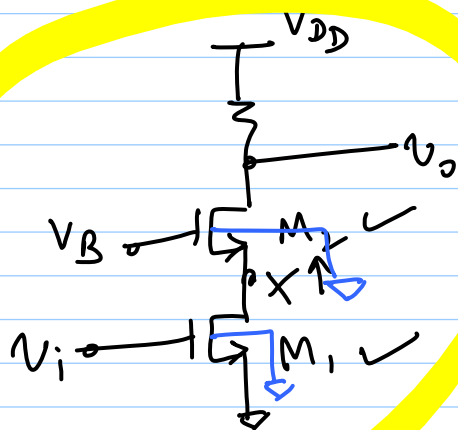


$$v_o = -g_m R_L v_i$$

$$C_{in} = C_{gs} + C_{gd}(1+g_m R_L)$$

Cascode Stage

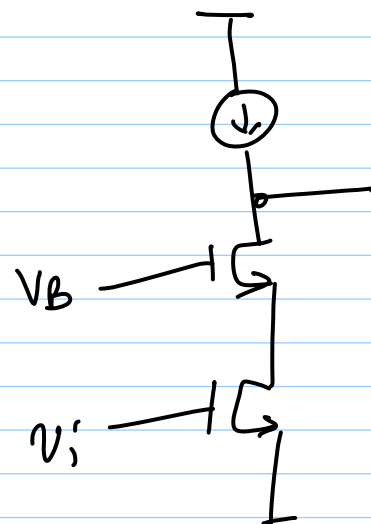
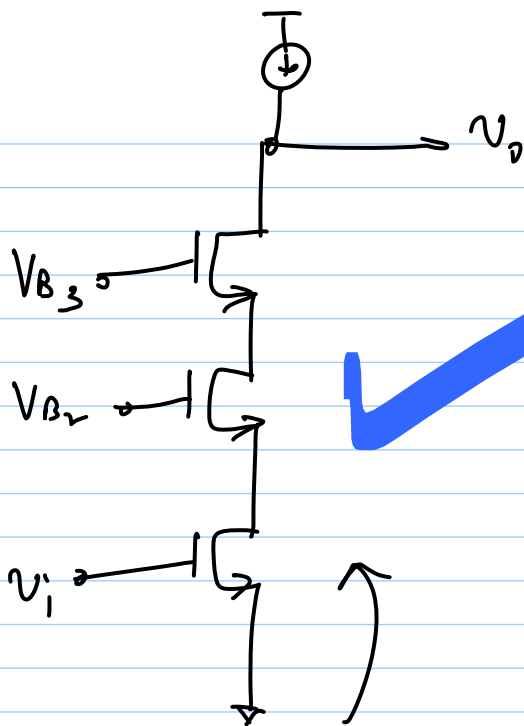
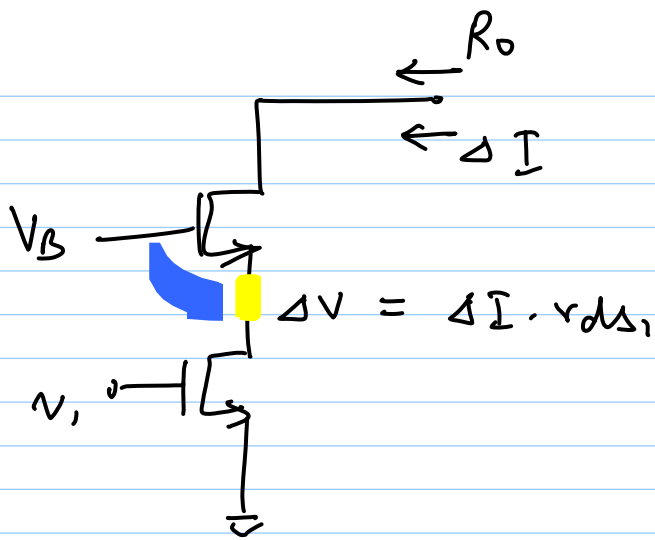
1) Disadvantage: Swing limits



$$v_x = -v_i$$

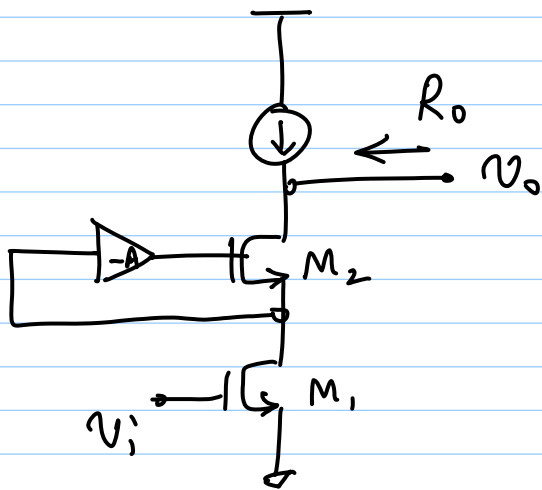
$$V_B = V_{DSAT1} + V_{\omega_2}$$

$$V_B \geq V_{T2} + 2V_{DSAT}$$

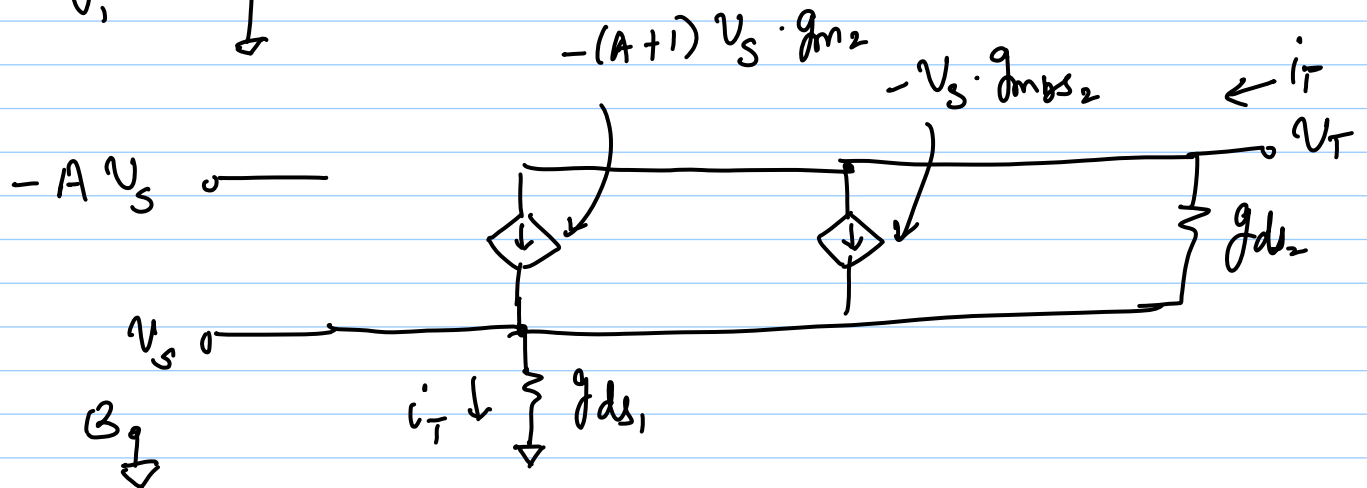


$$-(g_{m1} r_{ds1}) (g_{m2} r_{ds2}) (g_{m3} r_{ds3})$$

Gain-boosted cascode



$R_o = ?$



$$R_o = \cancel{2r_{ds}} + \left[(A+1)g_m + \cancel{g_{mbs}} \right] \cdot r_{ds}^2$$

$$\approx A \cdot g_m r_{ds}^2$$

$$a_v = -g_m \cdot R_o = -(g_m r_{ds})^2 \cdot A$$

Folded - Cascode

