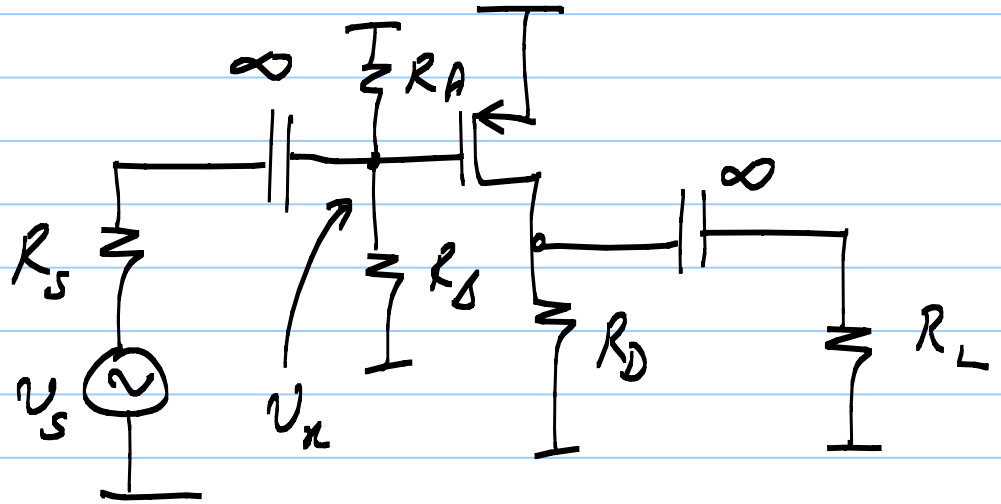
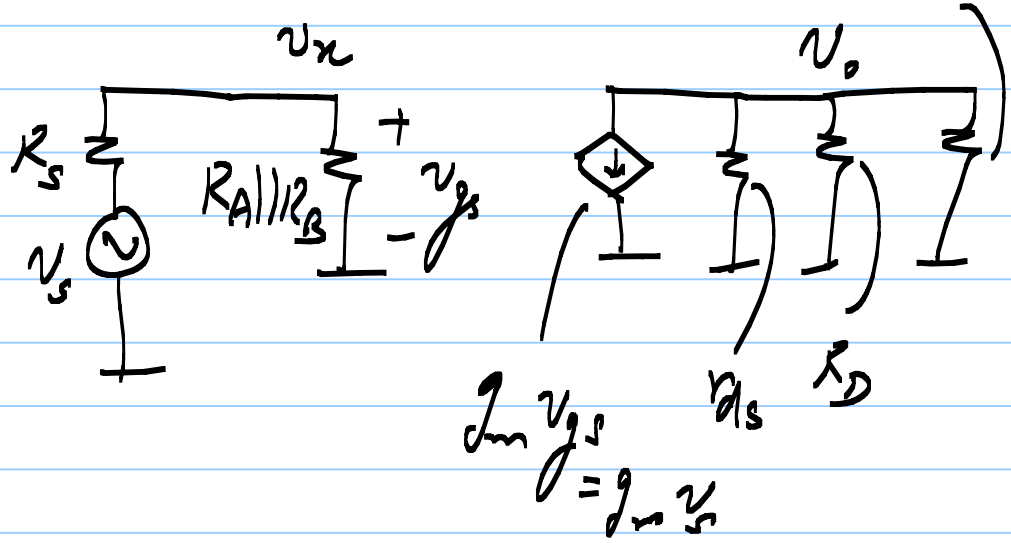
16/9/20

Lecture 25





$$v_x = \frac{R_A \| R_B}{R_s + R_A \| R_B} \cdot v_s$$

Choose $R_A \| R_B \gg R_s$

$\Rightarrow v_x \approx v_s$

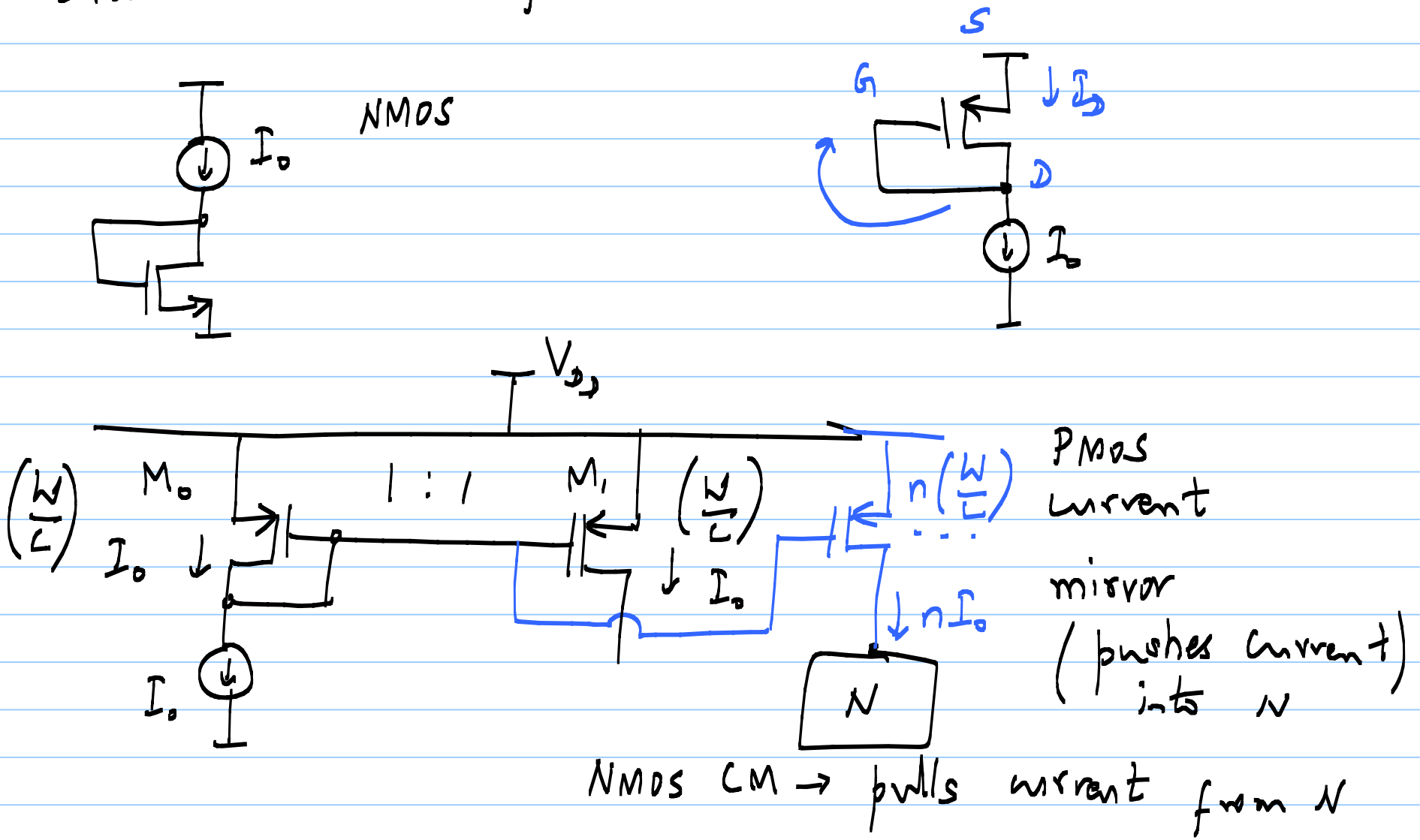
$$v_o = -g_m (r_{ds} \| R_D \| R_L) \cdot v_s$$

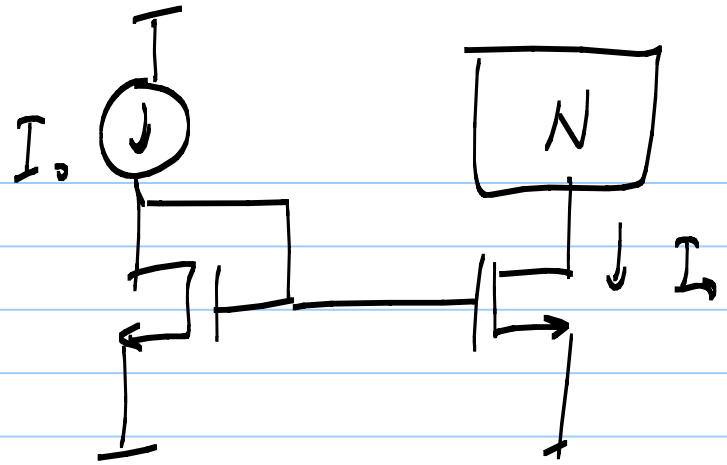
HW 11: Swing Limits: 1) Triode Limit : $V_D > V_G + V_{Tp}$

2) Cutoff Limit : $I_D = 0$

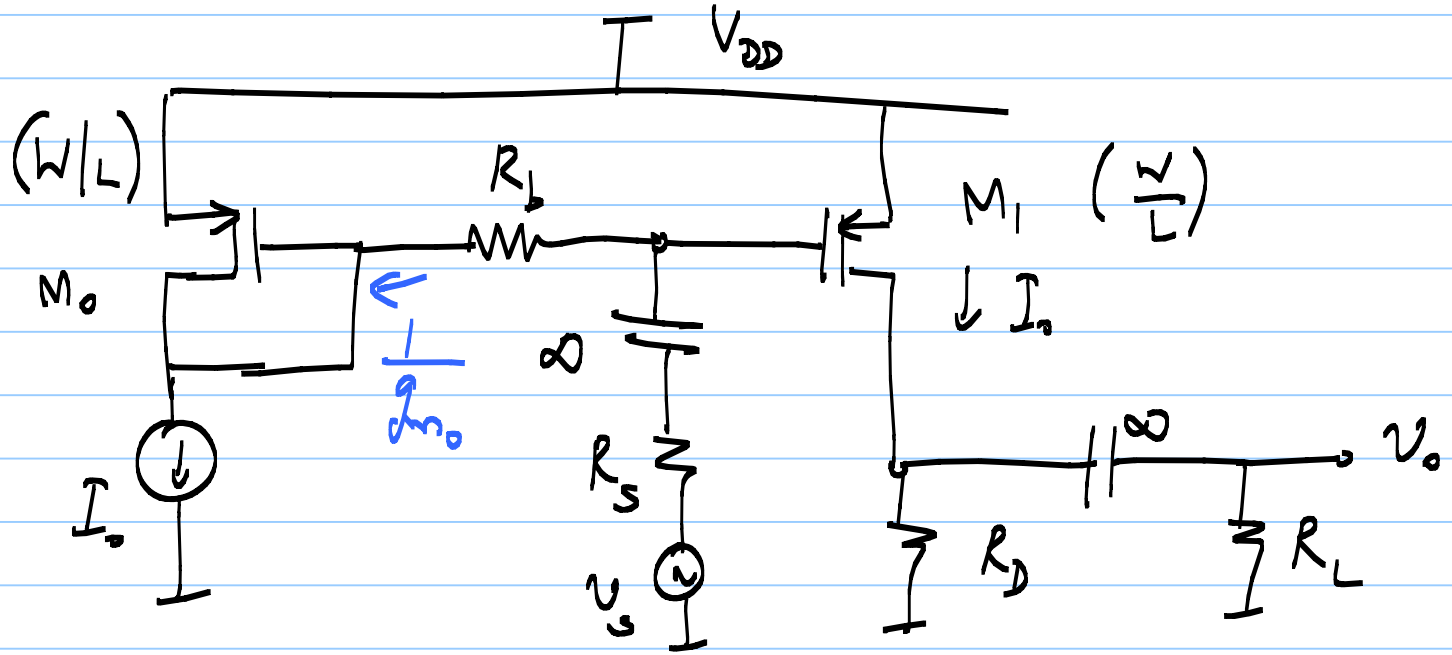
Bias Stabilization

(I) Drain to gate f.b.



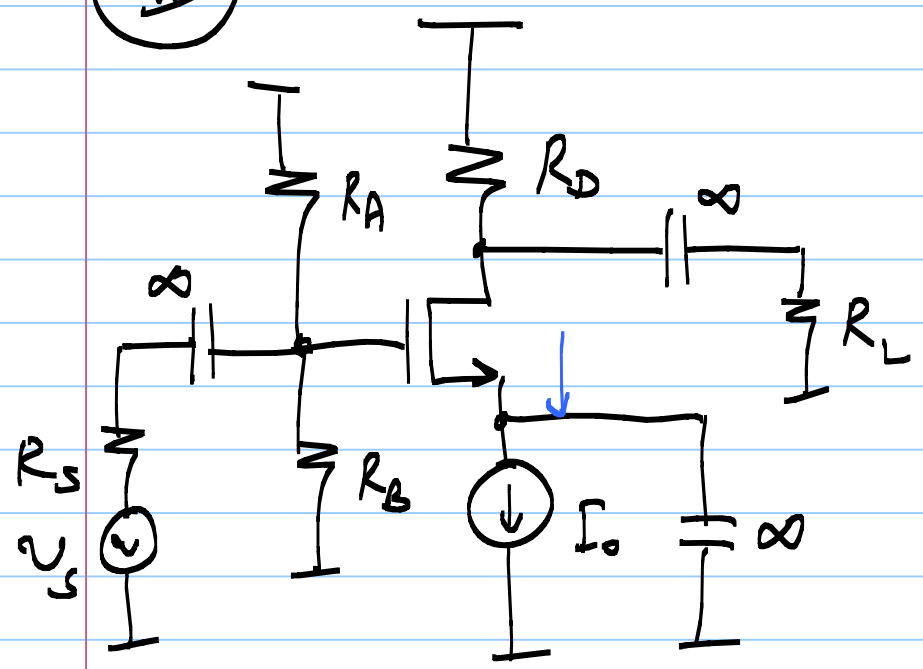


pulls current I_o from N.

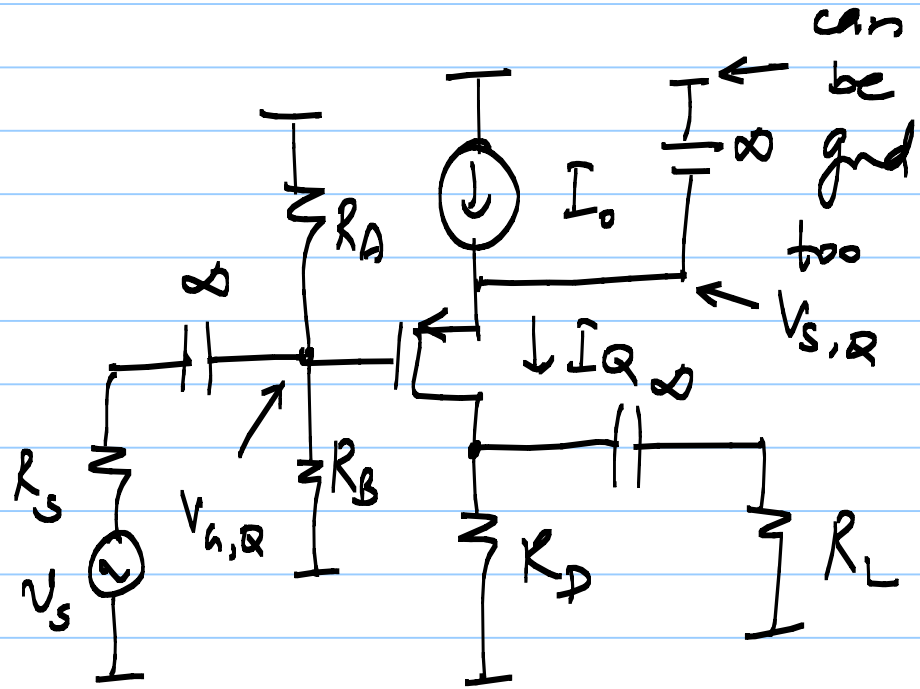


II

NMOS



PMOS



$$I_Q = I_o$$

$$V_{G,Q} = \frac{R_B}{R_A + R_B} \cdot V_{DD}$$

$$V_{D,Q} = I_o \cdot R_D$$

$$V_{s,Q} = V_{G,Q} + V_{SG,Q}$$

$$V_{SG,Q} = V_{Tp} + \sqrt{\frac{2I_o}{\mu_p C_{ox}\left(\frac{W}{L}\right)}}$$

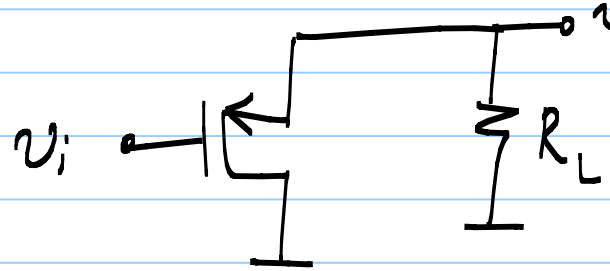
HW12 : SS analysis, swing limits

Case III & IV → HW13

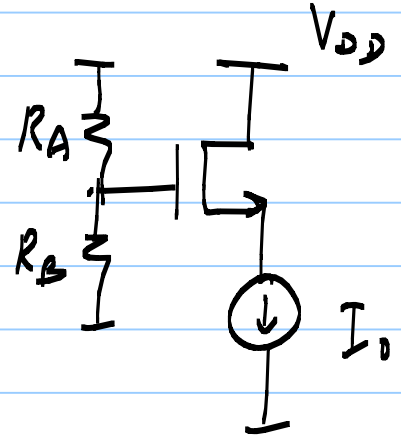
SS Controlled Sources (SS eq. circuits are identical)

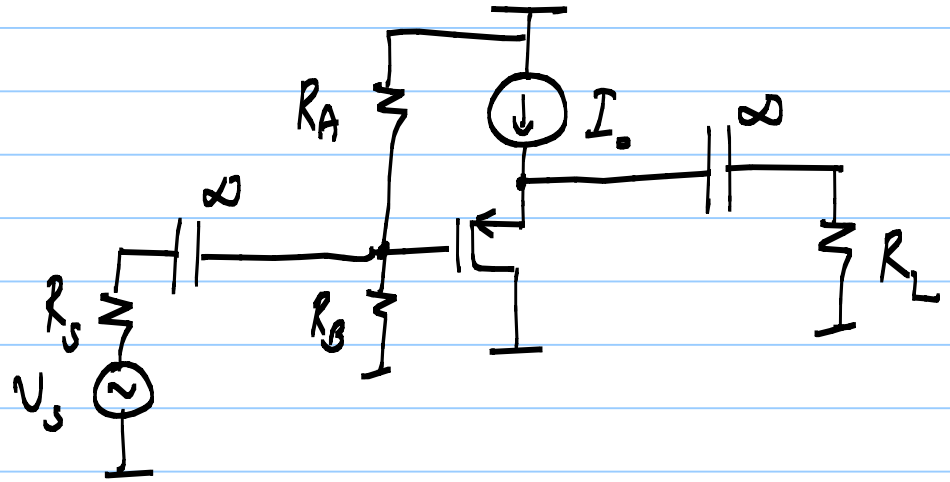
1) VCVS gain = 1 i.e. $v_o = v_i$

PMOS Common Drain Amplifier



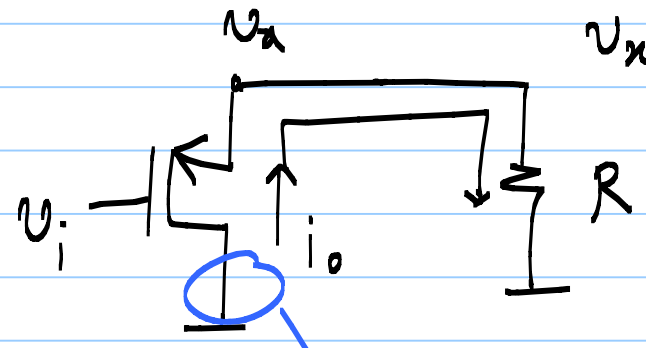
$$\frac{v_o}{v_i} = \frac{g_m}{g_m + g_{ds} + G_L}$$





PMOS CDA

2) VCCS – TCA (PMOS) $\quad i_o = \frac{v_i}{R}$



as $g_m \to \infty$, $v_x \approx v_i$

$i_o = \frac{v_i}{R}$