

4/9/20

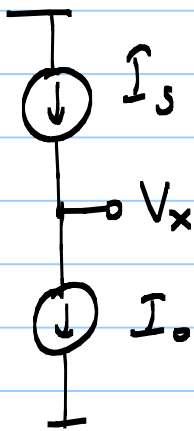
Lecture 19

Bias Stab.

	<u>Sensed</u>	<u>Controlled</u>
no opamps required in general	I_D I_S I_D I_S	V_G V_S V_S V_G

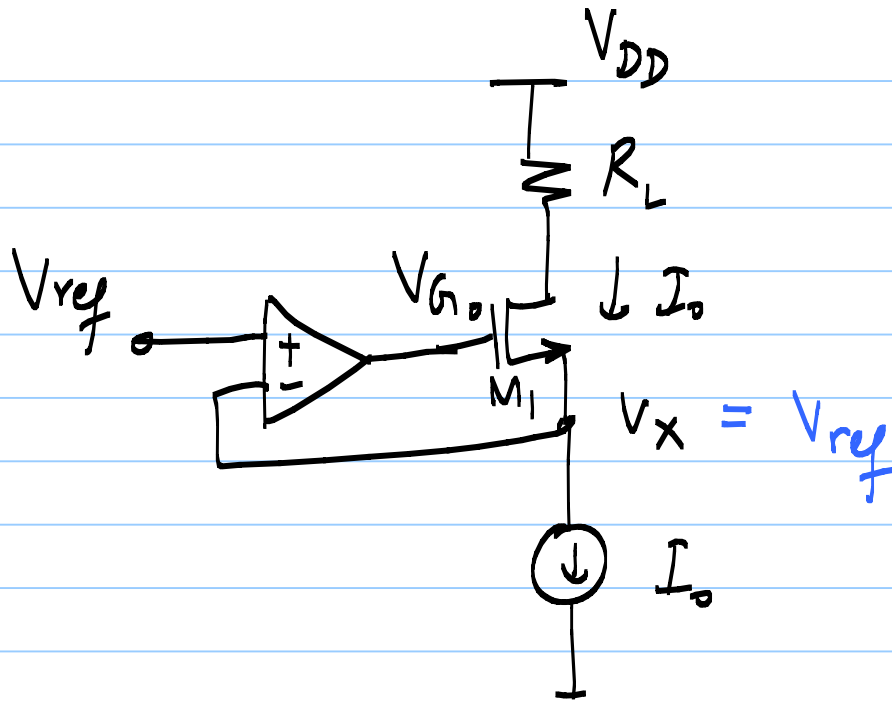
Need opamp for cases 3 & 4 because of polarity inversion in f.b.

Case 4



$$I_S > I_O \Rightarrow V_x \uparrow \quad (\text{we need to } \downarrow V_G)$$

$$I_S < I_O \Rightarrow V_x \downarrow \quad (\text{we need to } \uparrow V_G)$$



$$V_{G_0} = V_{ref} + V_{GS}|_{I_0}$$

$$V_{D_0} = V_{DD} - I_0 R_L$$

$$V_{S_0} = V_{ref}$$

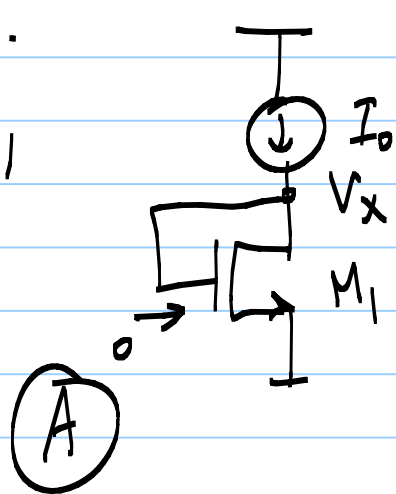
Choose V_{ref} so that M_1 is in sat.

$$V_{D_0} \geq V_{G_0} - V_T$$

* You can use opamps in cases 1 & 2 also

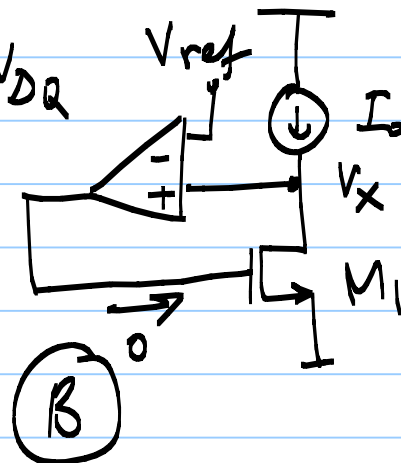
e.g.

case 1



$$V_x = V_{G_0} = V_{D_0}$$

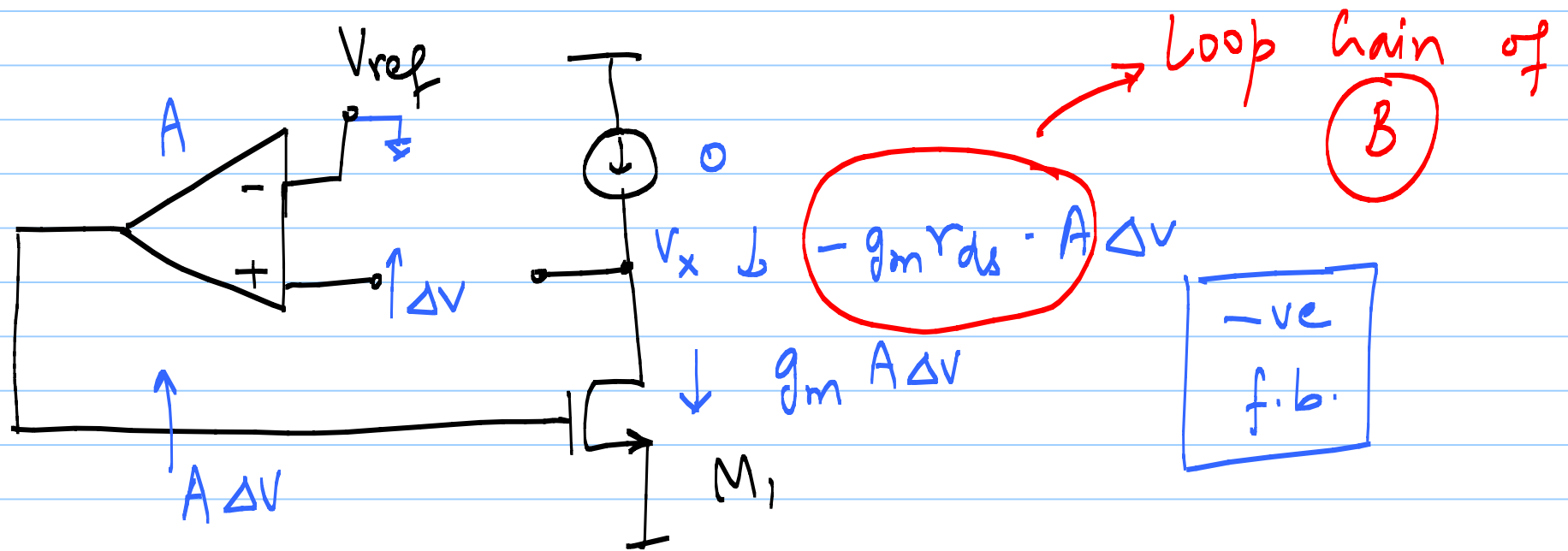
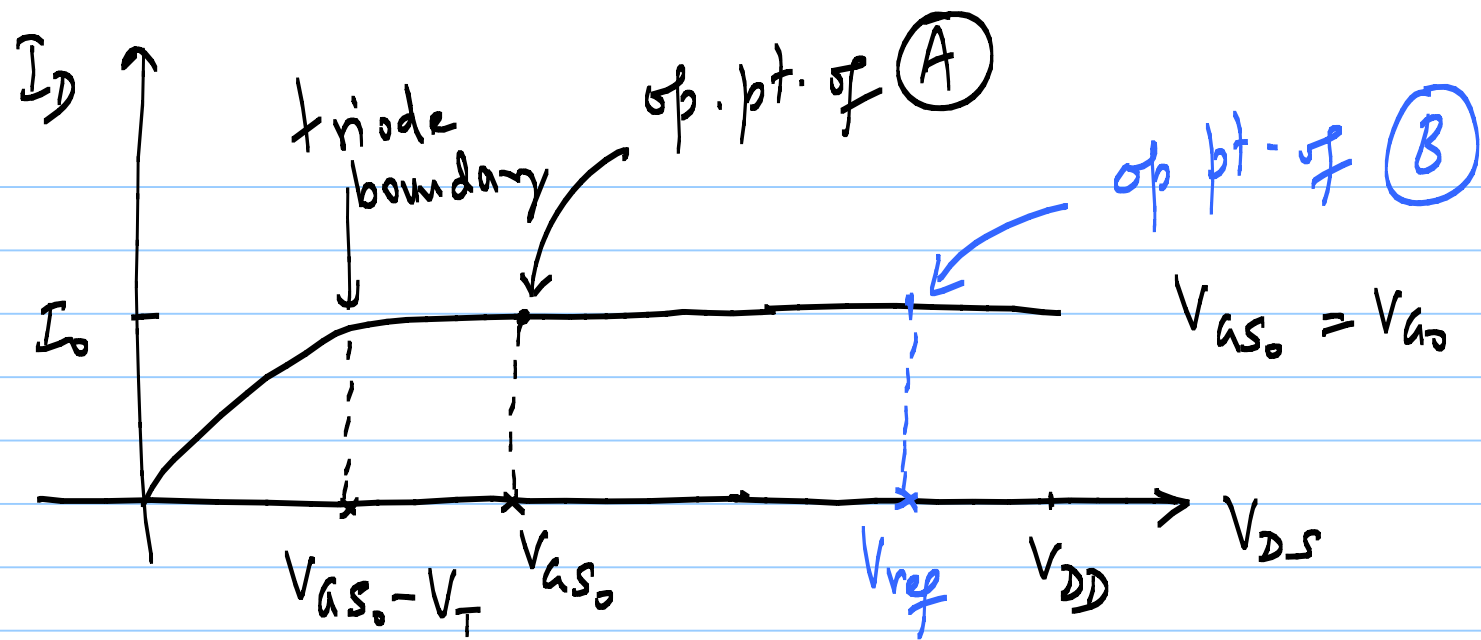
$$V_{G_0} = V_{GS}$$



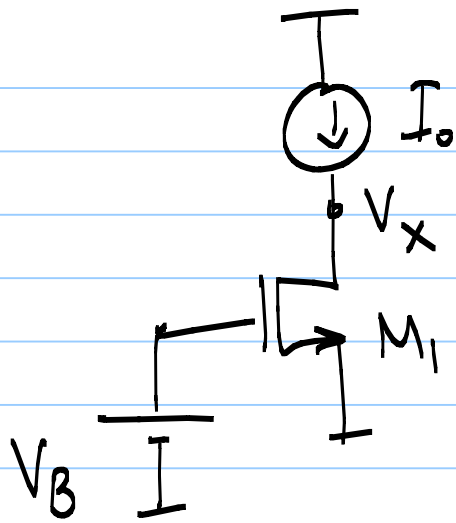
$$V_x = V_{ref} = V_{D_0}$$

$$V_{G_0} = V_{GS}$$

can be biased further from triode boundary



Loop gain of (A) = $-g_m r_{ds}$



$$V_B \neq V_{GS}|_{I_0}$$

I $V_B < V_{GS}|_{I_0} \Rightarrow V_x \uparrow \rightarrow \infty$

II $V_B > V_{GS}|_{I_0} \Rightarrow V_x \downarrow$

