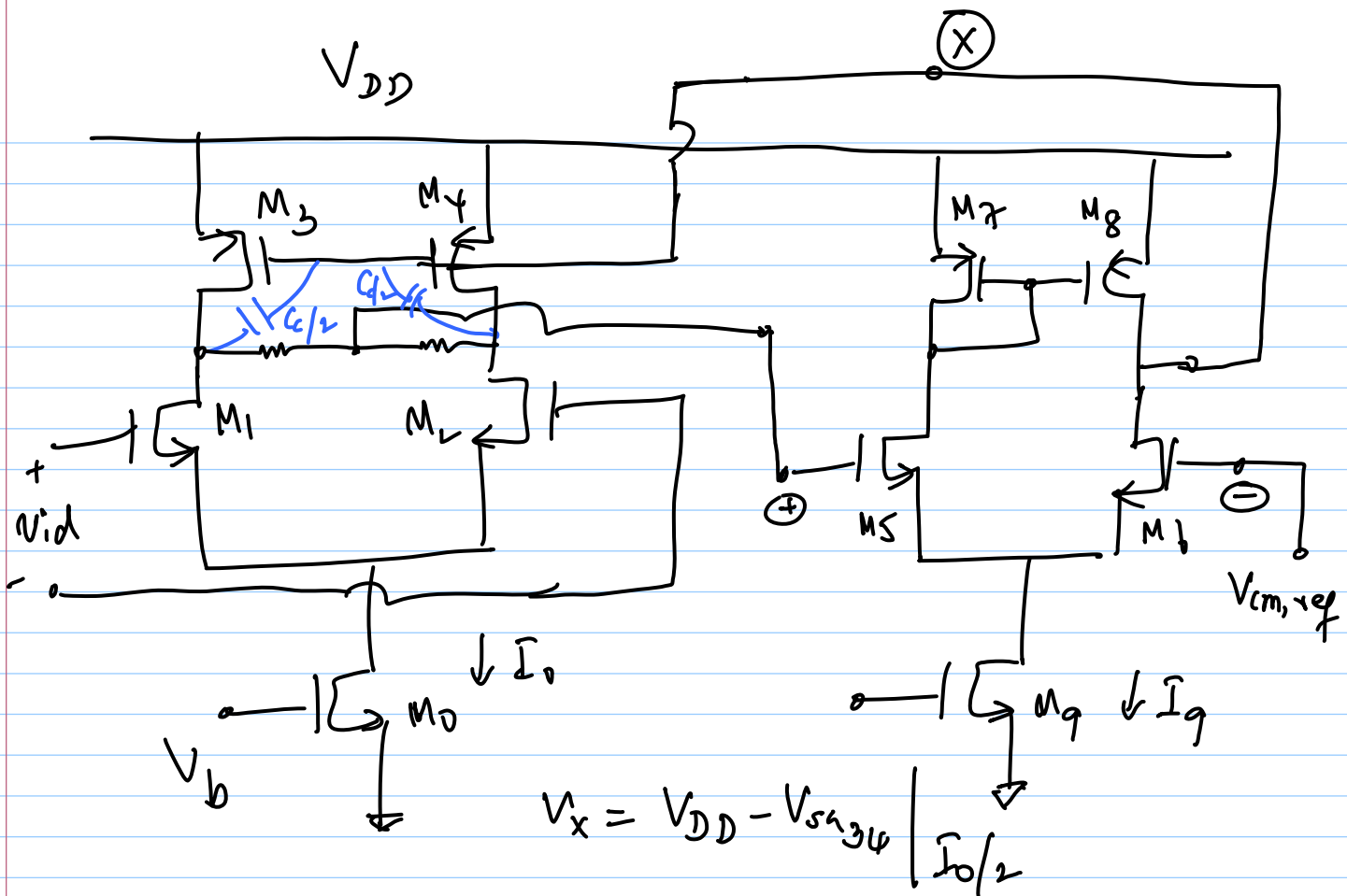


13-3-13

Lec 36

Common-mode feedback (CMFB)

- * Measure o/p CM
- * feedback in the right direction ($-ve$ f.b.)
- * CM $LL = \infty \Rightarrow V_{oCM} = V_{cm,ref}$



make

$$V_{DD} - V_{S_{M34}} \Big|_{I_{D/2}} = V_{DD} - V_{S_{M78}} \Big|_{I_{D/2}}$$

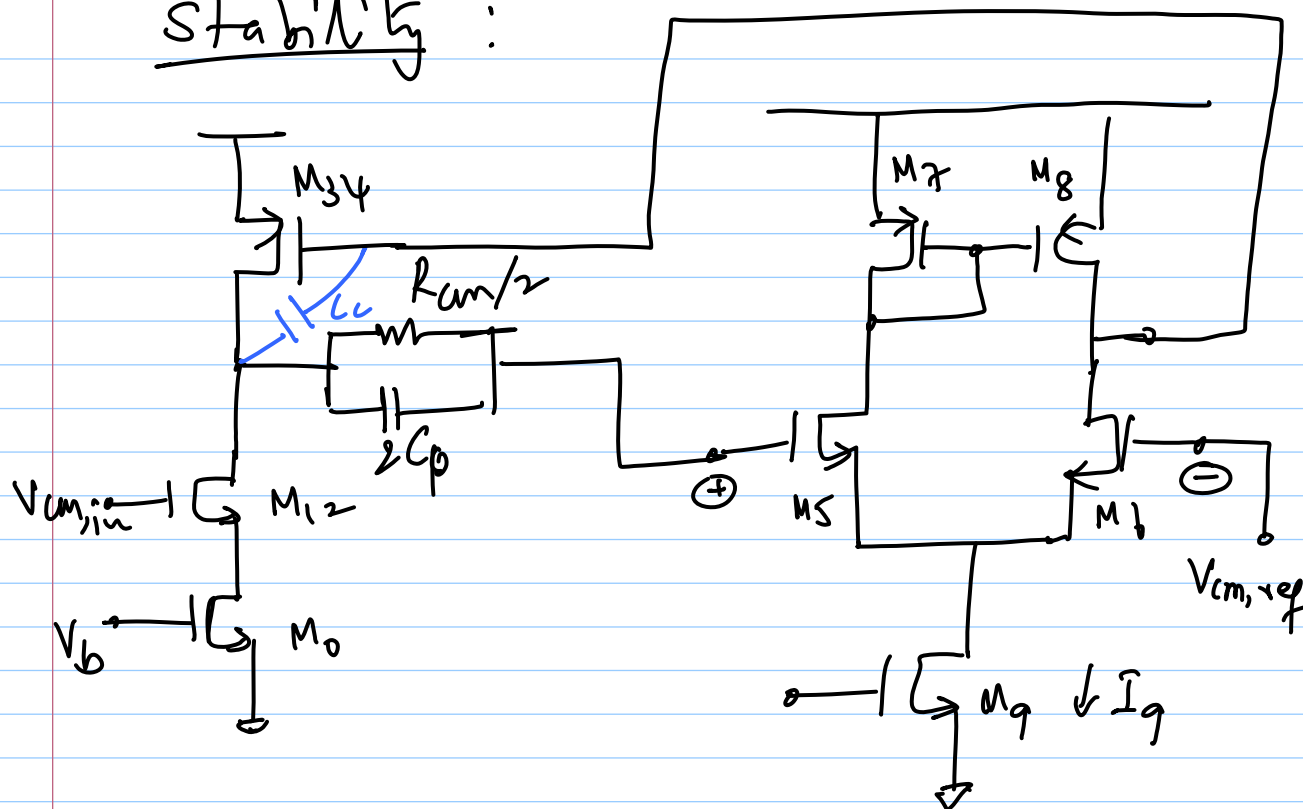
so that $V_{A_{MS}} = V_{cm,ref}$

* Same current density in M_{34} & M_{78}

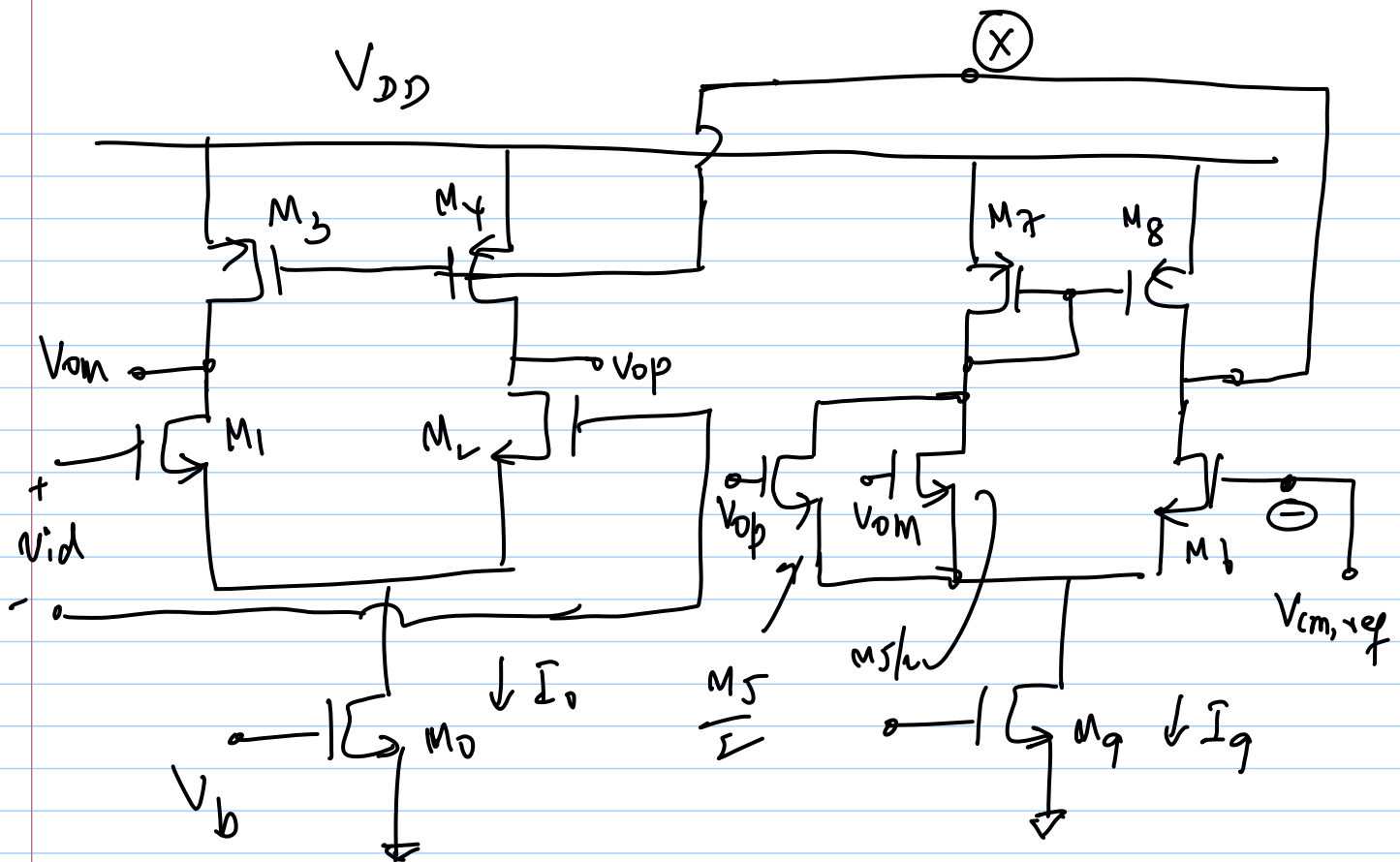
$$\frac{W_3}{I_{D/2}} = \frac{W_7}{I_{D/2}} \quad \text{Replica Bias}$$

$$V_{o,cm} = V_{cm,ref} + \frac{V_{S_{M3}} \Big|_{I_{D/2}} - V_{S_{M7}} \Big|_{I_{D/2}}}{A_{cmFB}}$$

Stability :



C_c - miller compensation



Active CM Detector

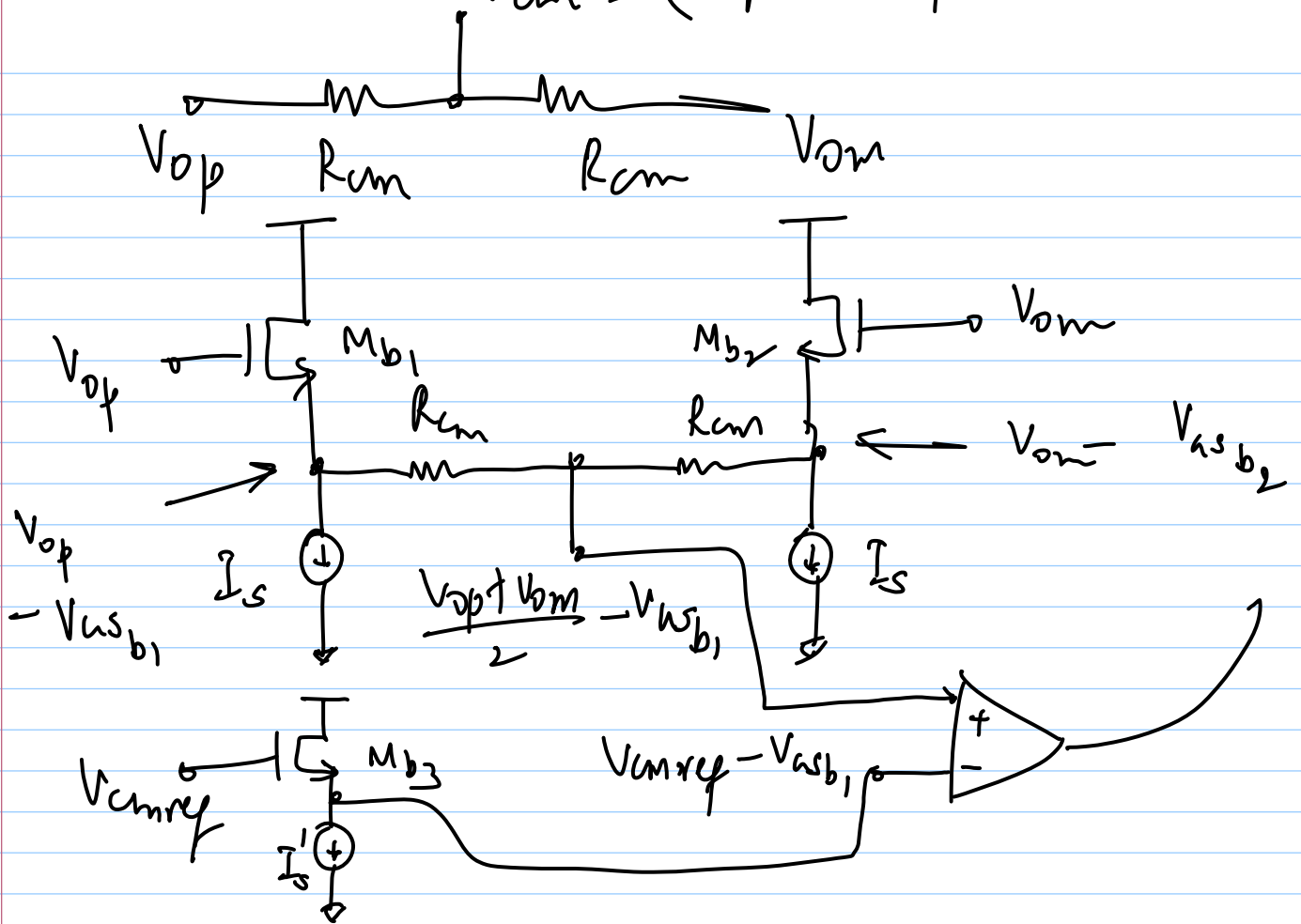
$$V_{\oplus} = \frac{V_{op} + V_{om}}{2} ; V_{\ominus} = 0 (V_{cm,ref})$$

$$i_s = \frac{g_{m5}}{2} \left[\frac{V_{op} + V_{om}}{2} \right]$$

$$= \frac{g_{m5}}{2} \cdot \left(\frac{V_{op}}{2} \right) + \frac{g_{m5}}{2} \cdot \left(\frac{V_{om}}{2} \right)$$

- * R_{cm} is linear, but this detector is linear only for small V_{op} , V_{om}
- * Can be used in 1st stage of F.D. 2-stage opamp.

$$V_{cm} = (V_{op} + V_{om})/2$$



Replica bias :- M_{b3} has same current density as $M_{b1,2}$

2 stage

