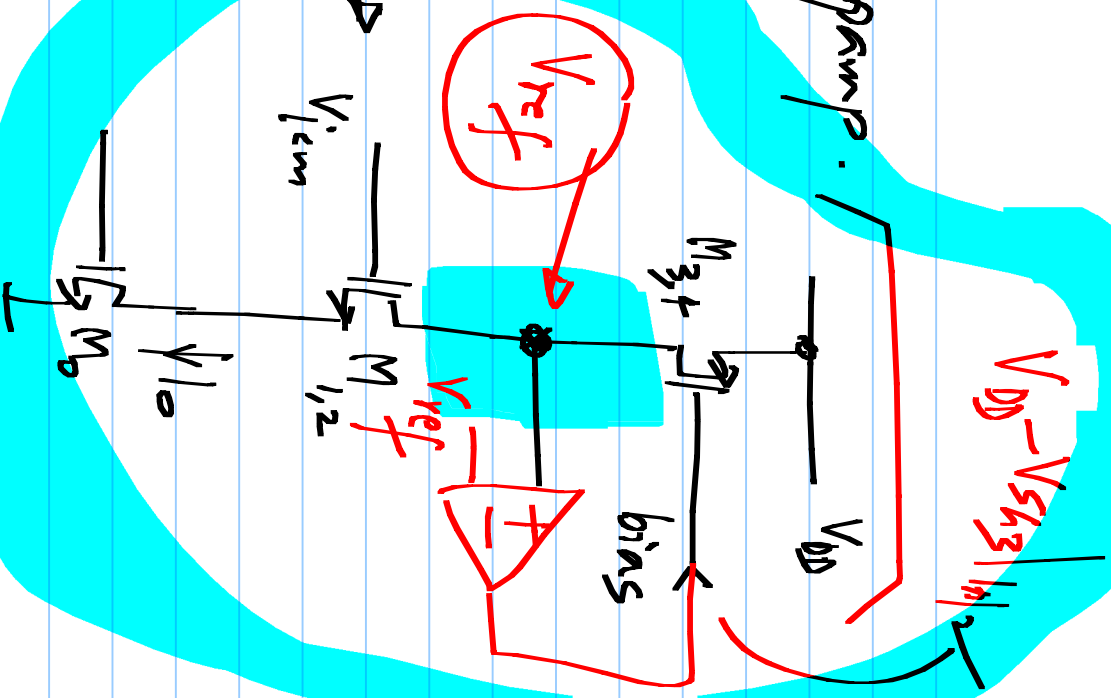
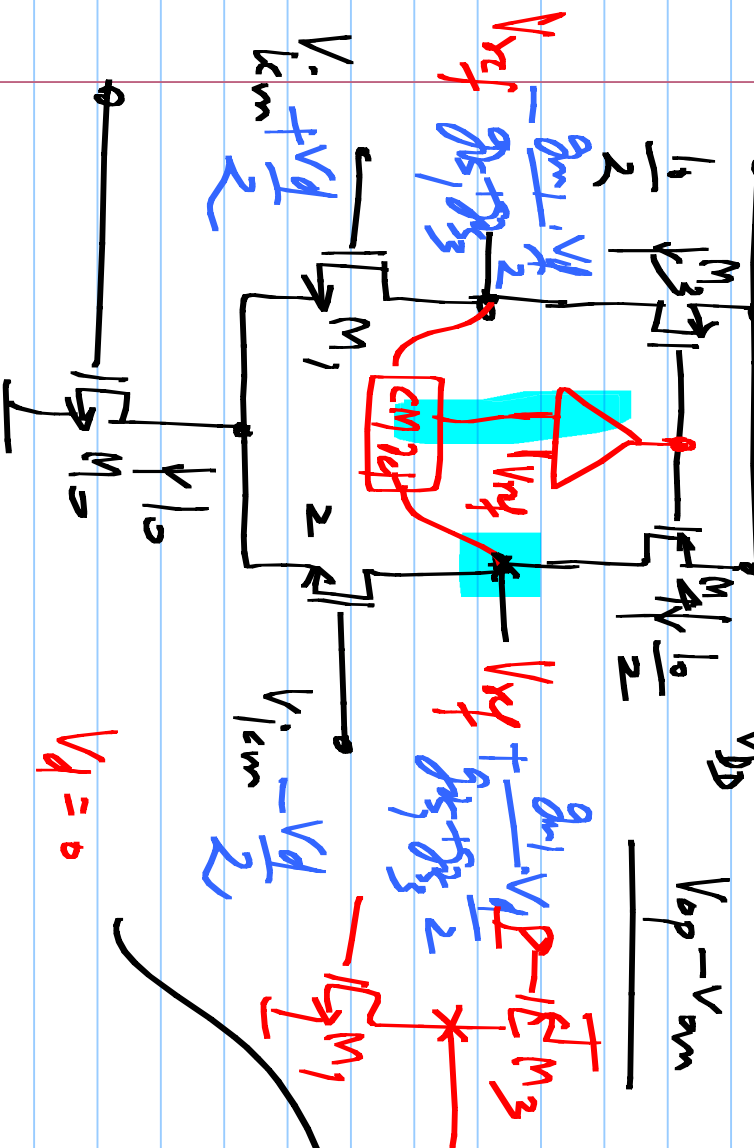
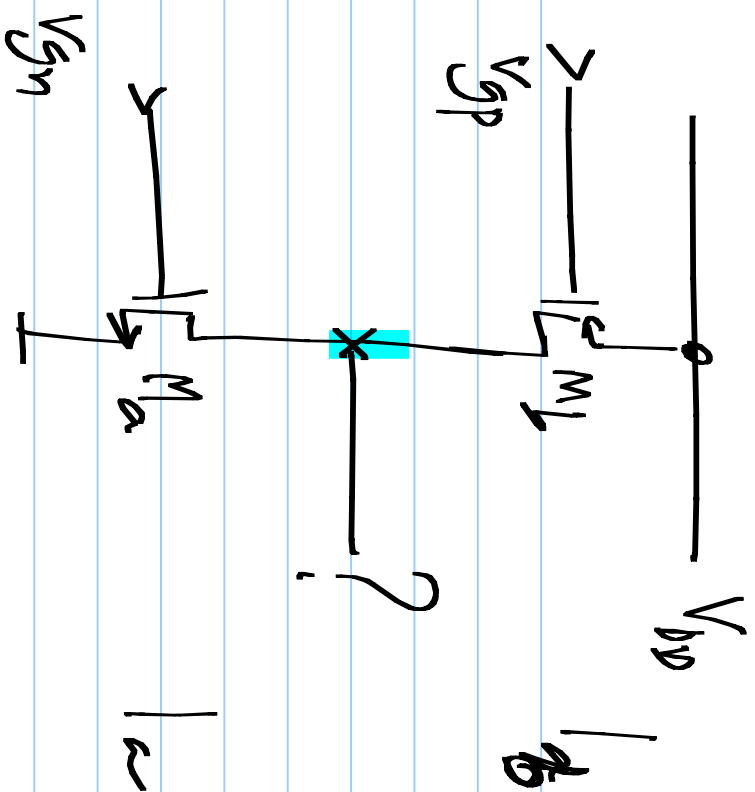


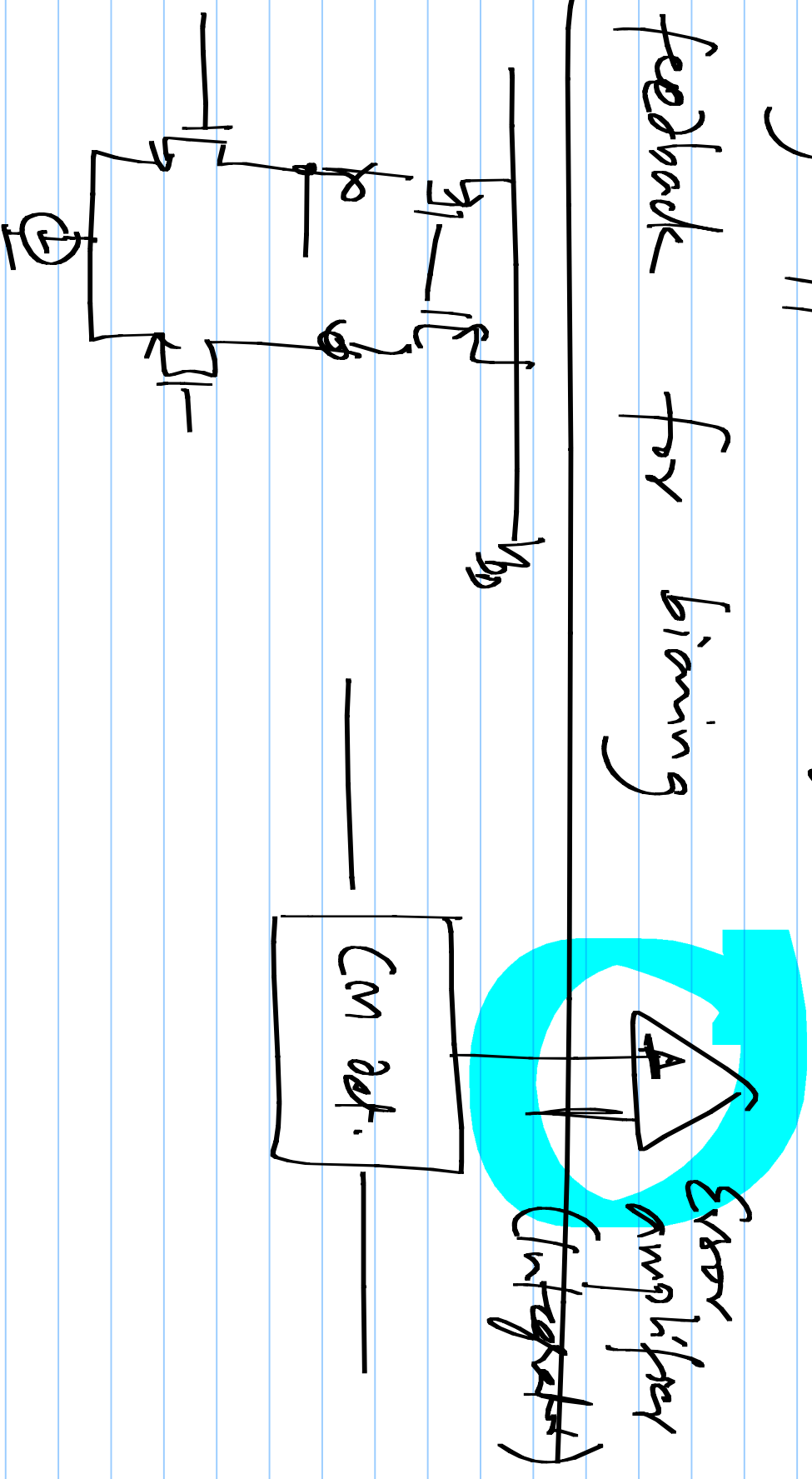
23/3/2016

Fully differential single stage opamp.





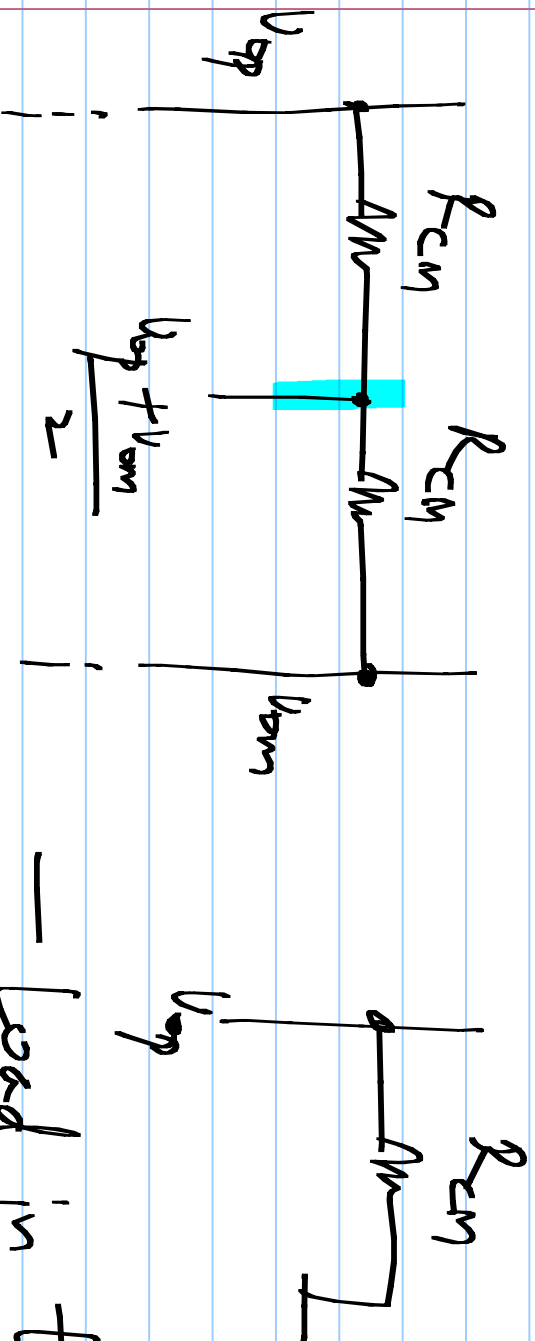
Fully differential circuits need common mode feedback for biasing



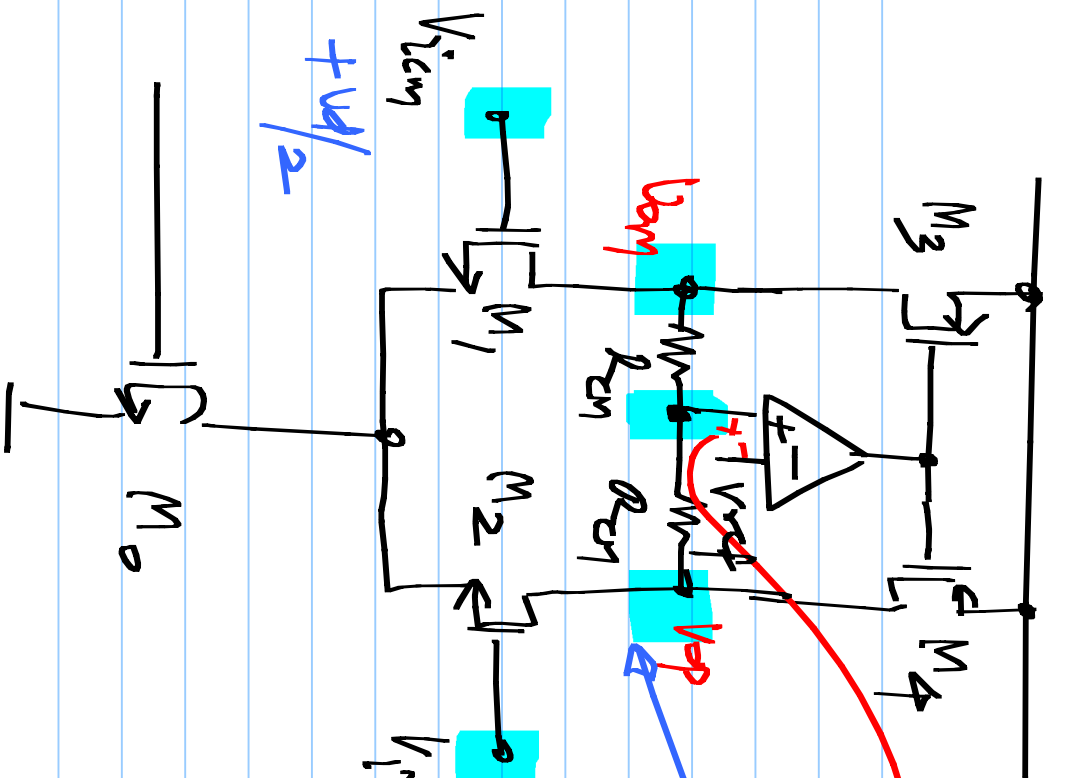
CM detectors: $\{v_{op}, v_{cm}\} \rightarrow \propto \left[\frac{v_{op} + v_{cm}}{2} \right]$

Resistive common-mode detector

+ Linear



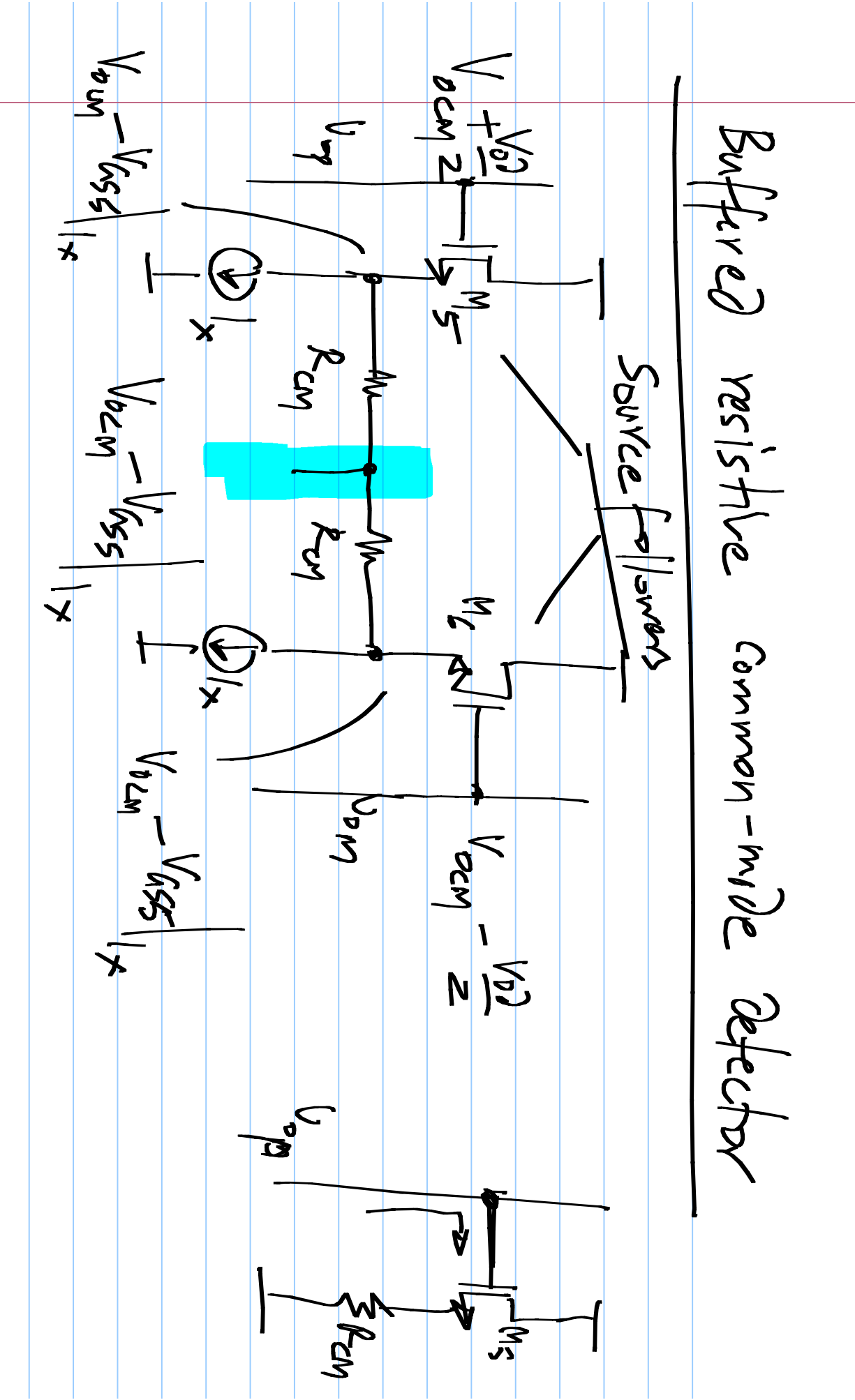
— load in the diff picture

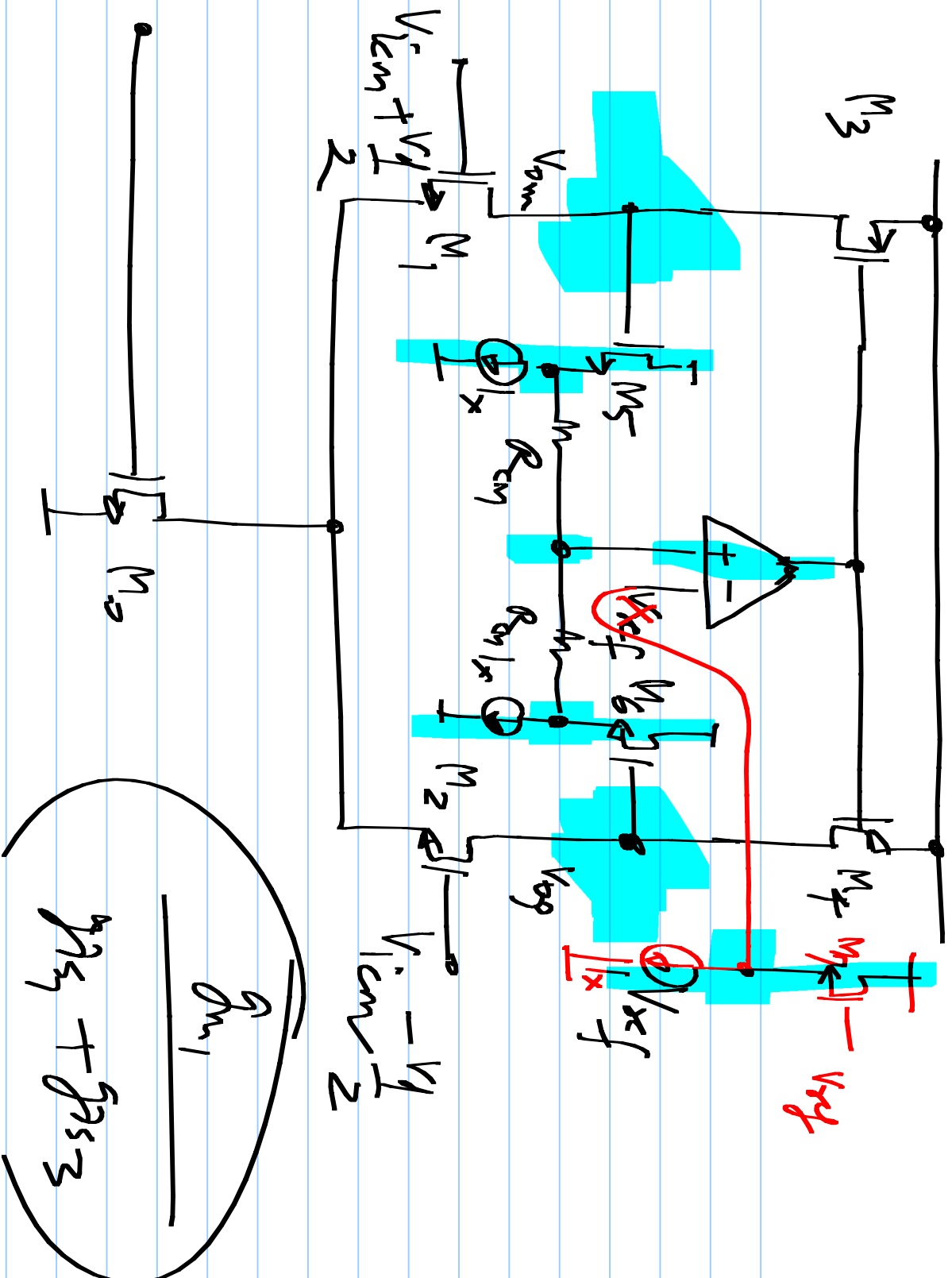


$$\left[\frac{V_{op} + V_{om}}{2} - V_{ref} \right]$$

$$\frac{g_{m1}}{g_{D1} + g_{D3} + g_{cm}} \cdot \frac{V_d}{2}$$

reduces the gain





Error voltage:
$$\frac{V_{op} + V_{om}}{2} - V_{xf}$$

$$\alpha \left(\frac{V_{op} - V_{xf}}{2} \right) + \left(\frac{V_{om} - V_{ref}}{2} \right)$$

