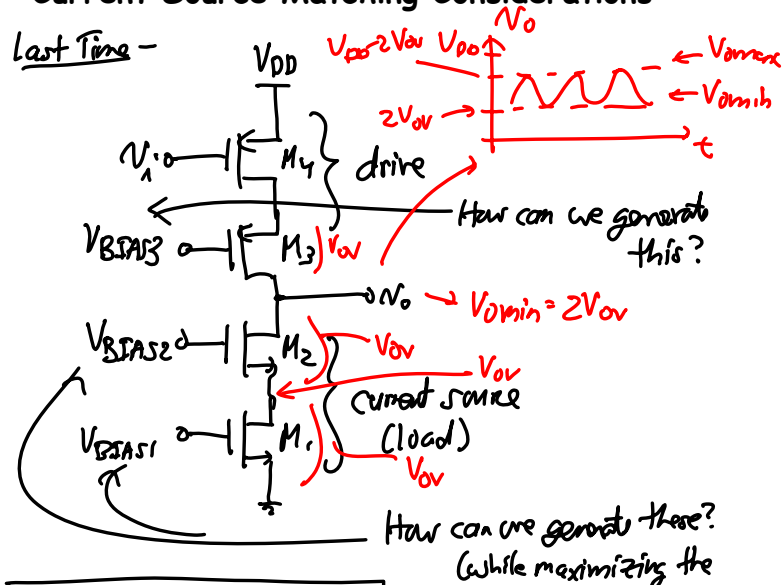


Today:

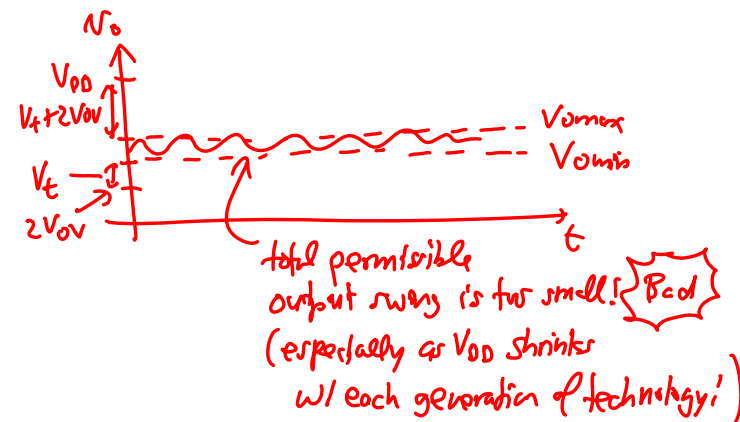
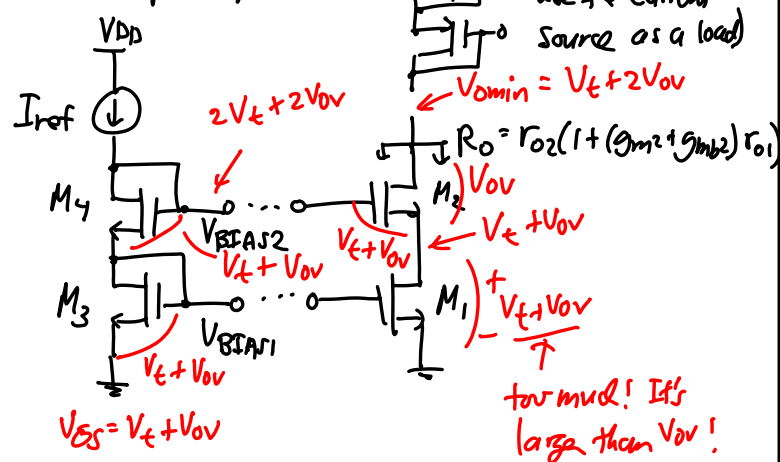
- High Swing Current Sources
- Current Source Matching Considerations

Last Time -



MOS Cascode Current Source

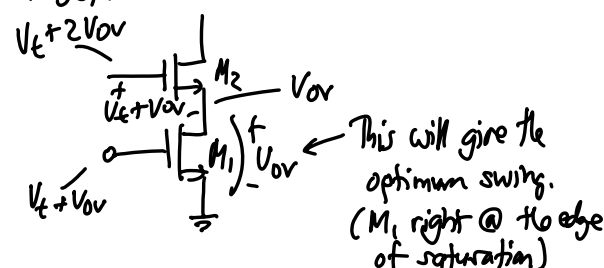
⇒ the simple way:



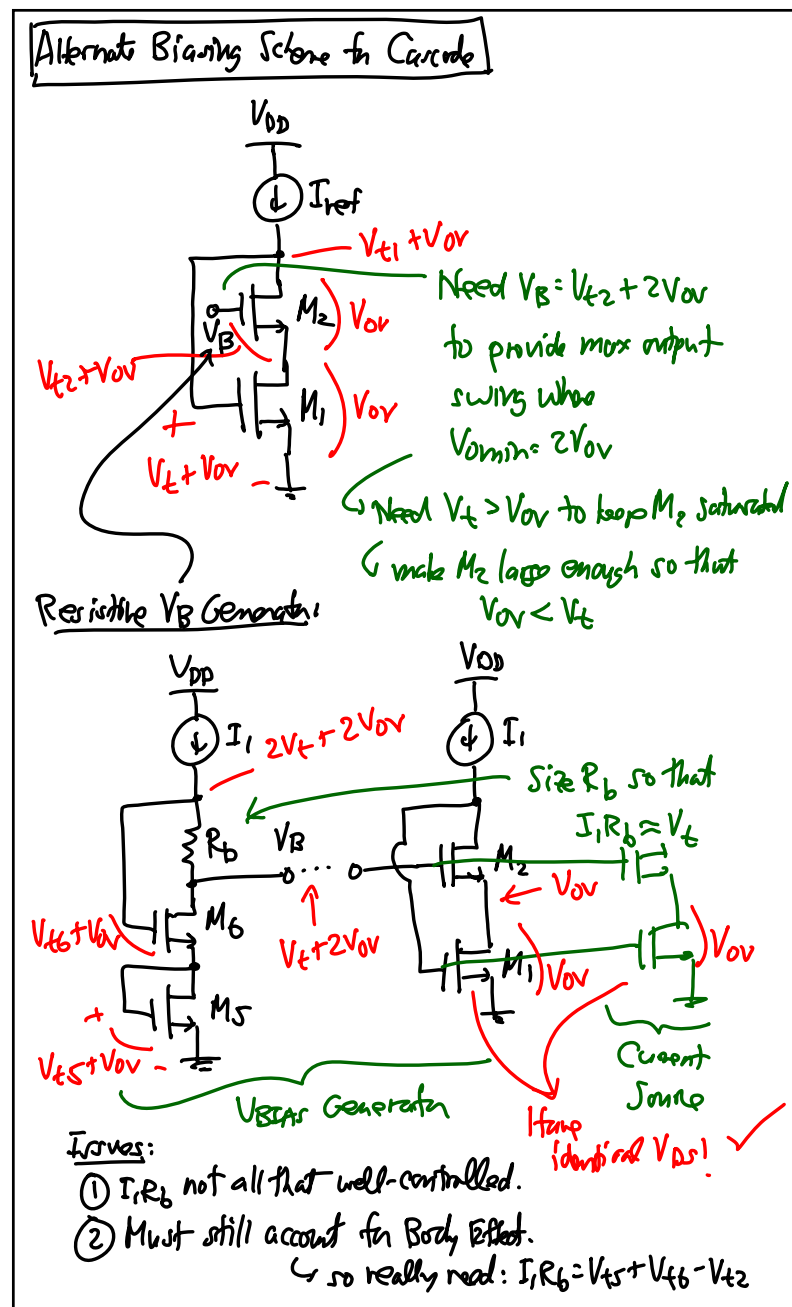
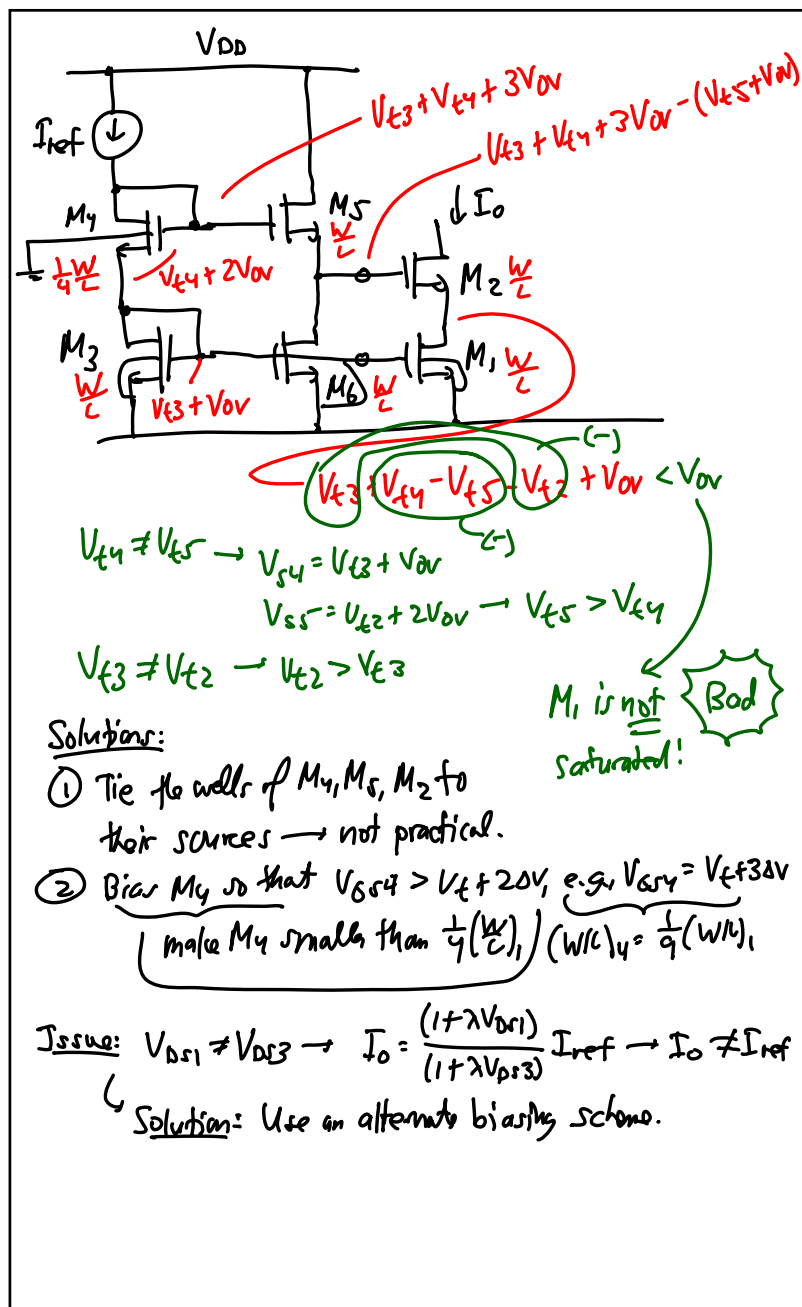
$V_{min} = V_t + 2V_{ov}$   
(typ.)  $\approx 0.7 + 2(0.3) = 1.3V$   
This is a lot in a 2V supply technology  $\rightarrow$  not permissible in a 1.1V  $= V_{DD}$  technology!

Soln: High Swing Cascode

⇒ Basic Idea: Level-shift down to reduce the  $V_{GS}$  of  $M_2$  to get:







Replace  $R_b$  w a transistor level-shift:

