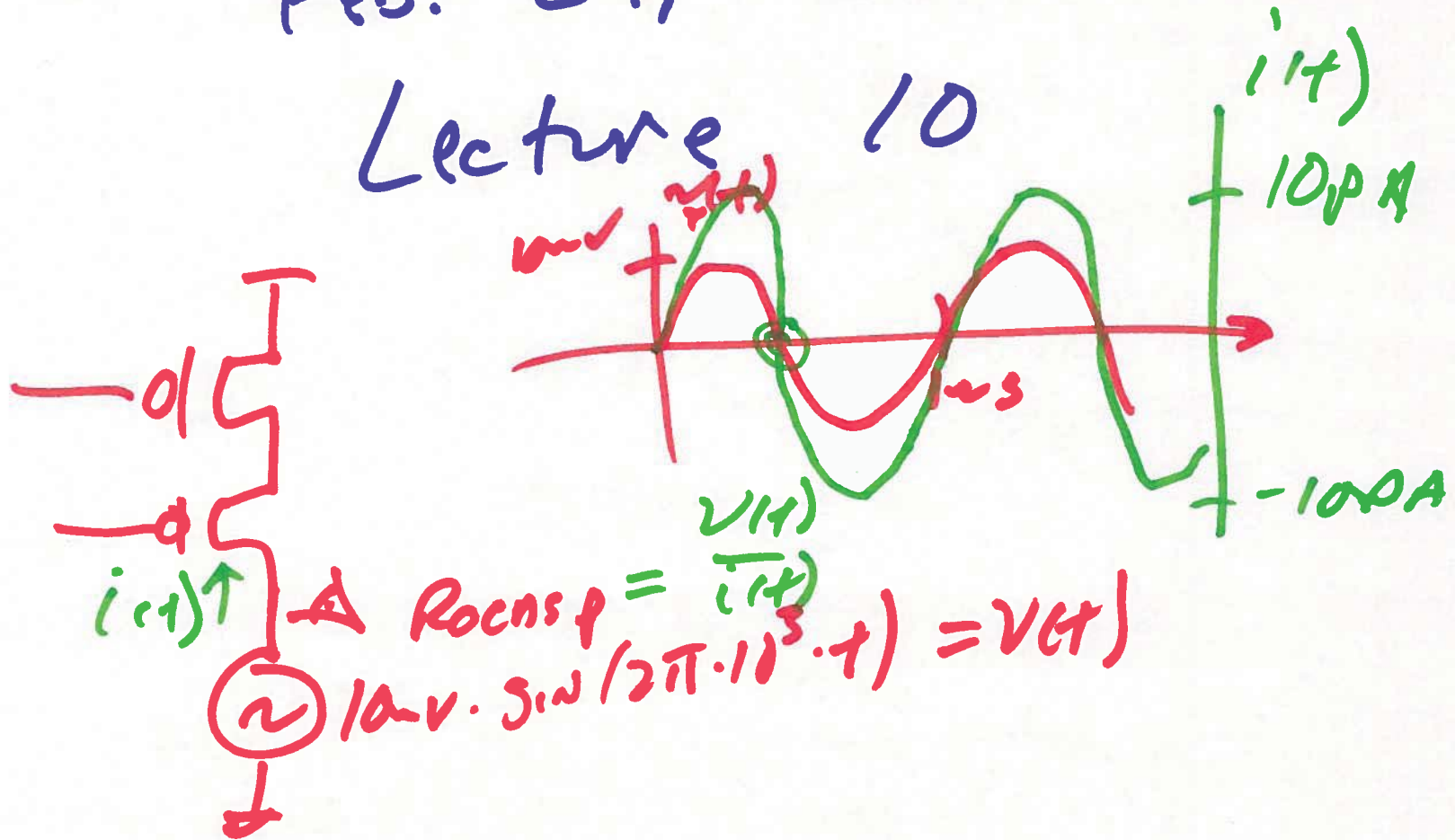


EE 420 / ECG 620

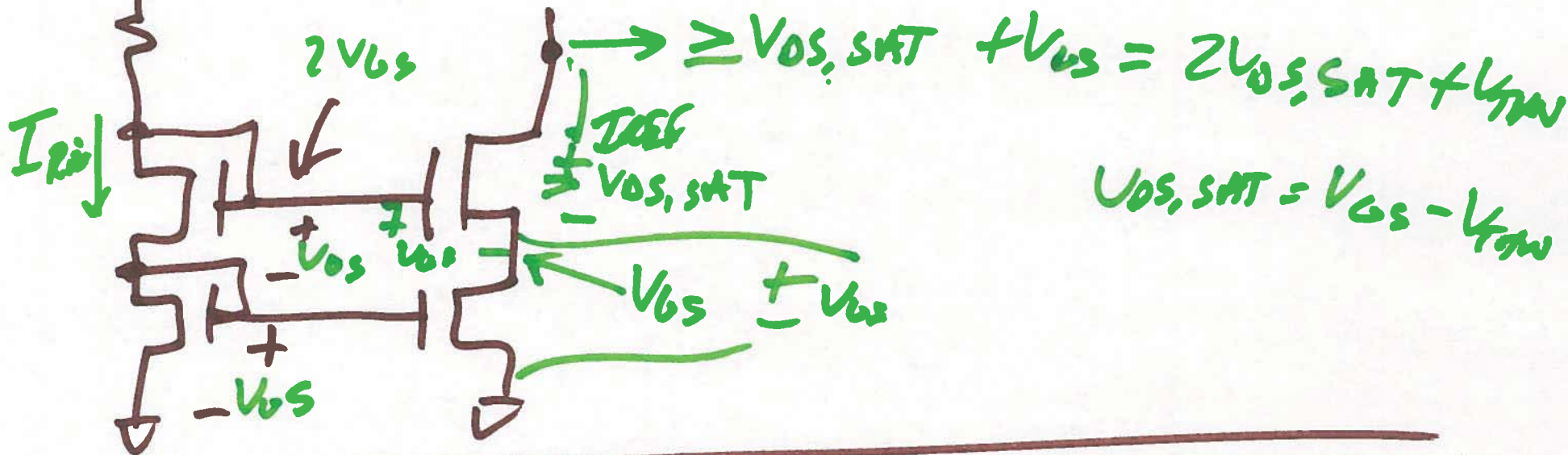
Analog IC Design

Feb. 27, 2019

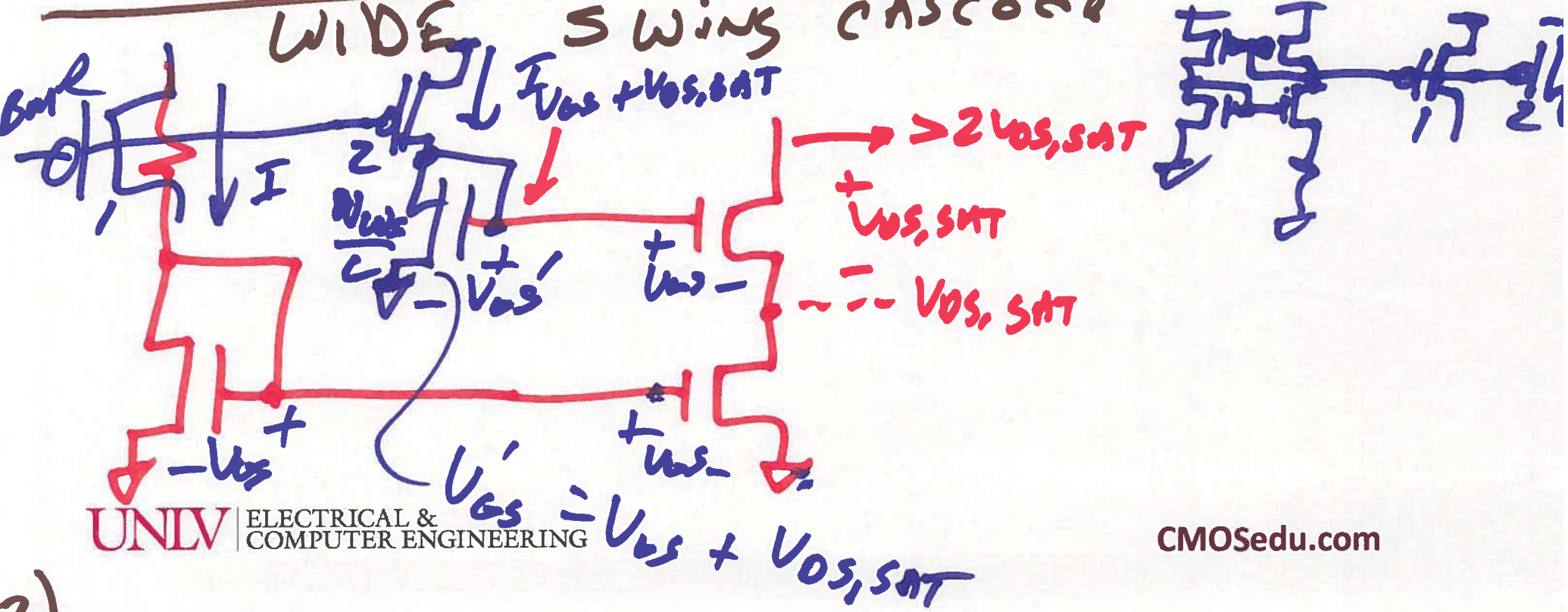
Lecture 10



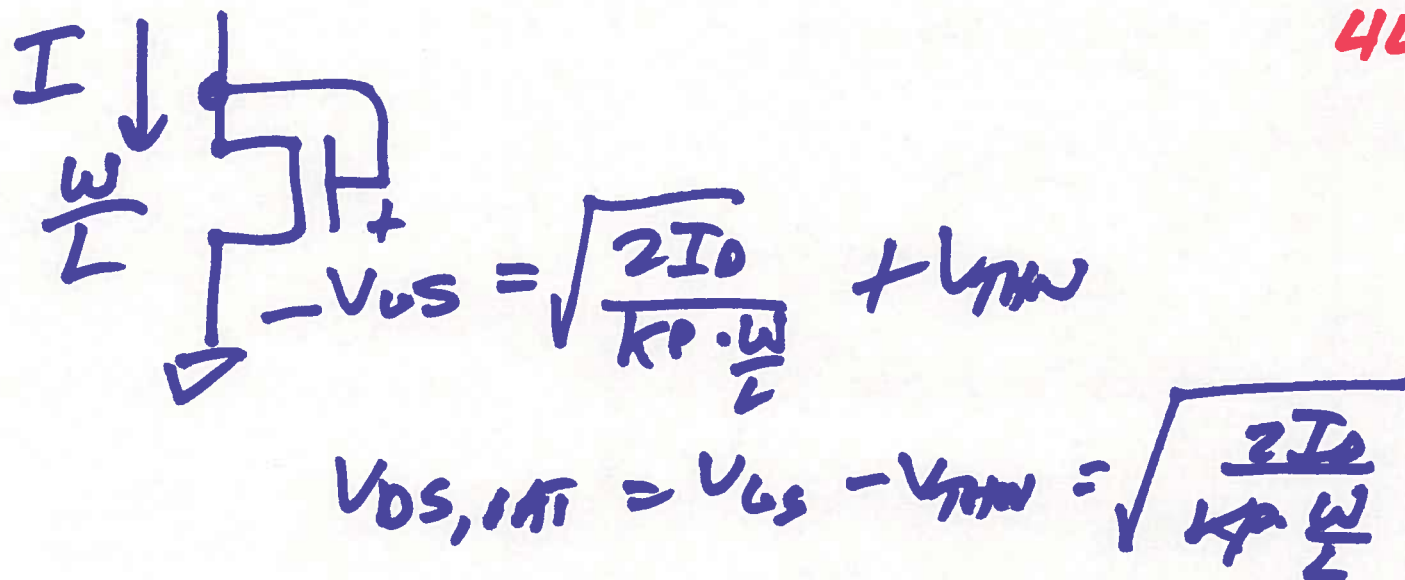
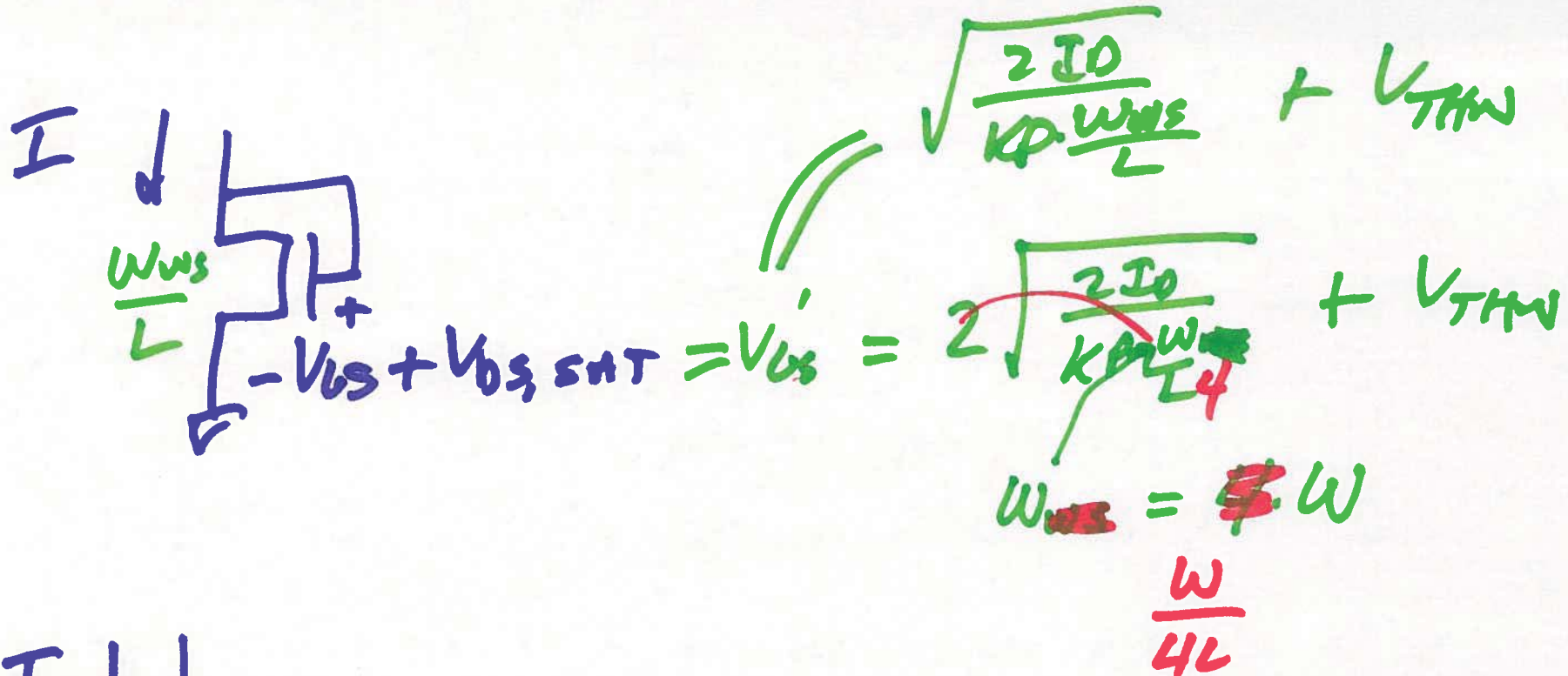
Normal CASCODE



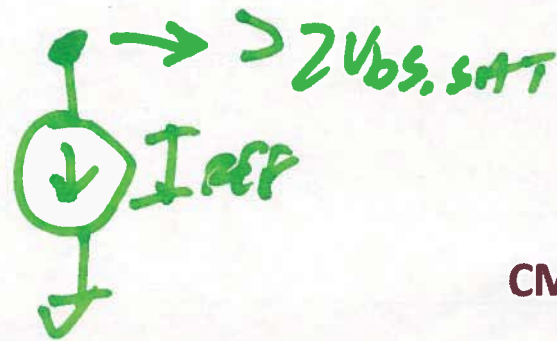
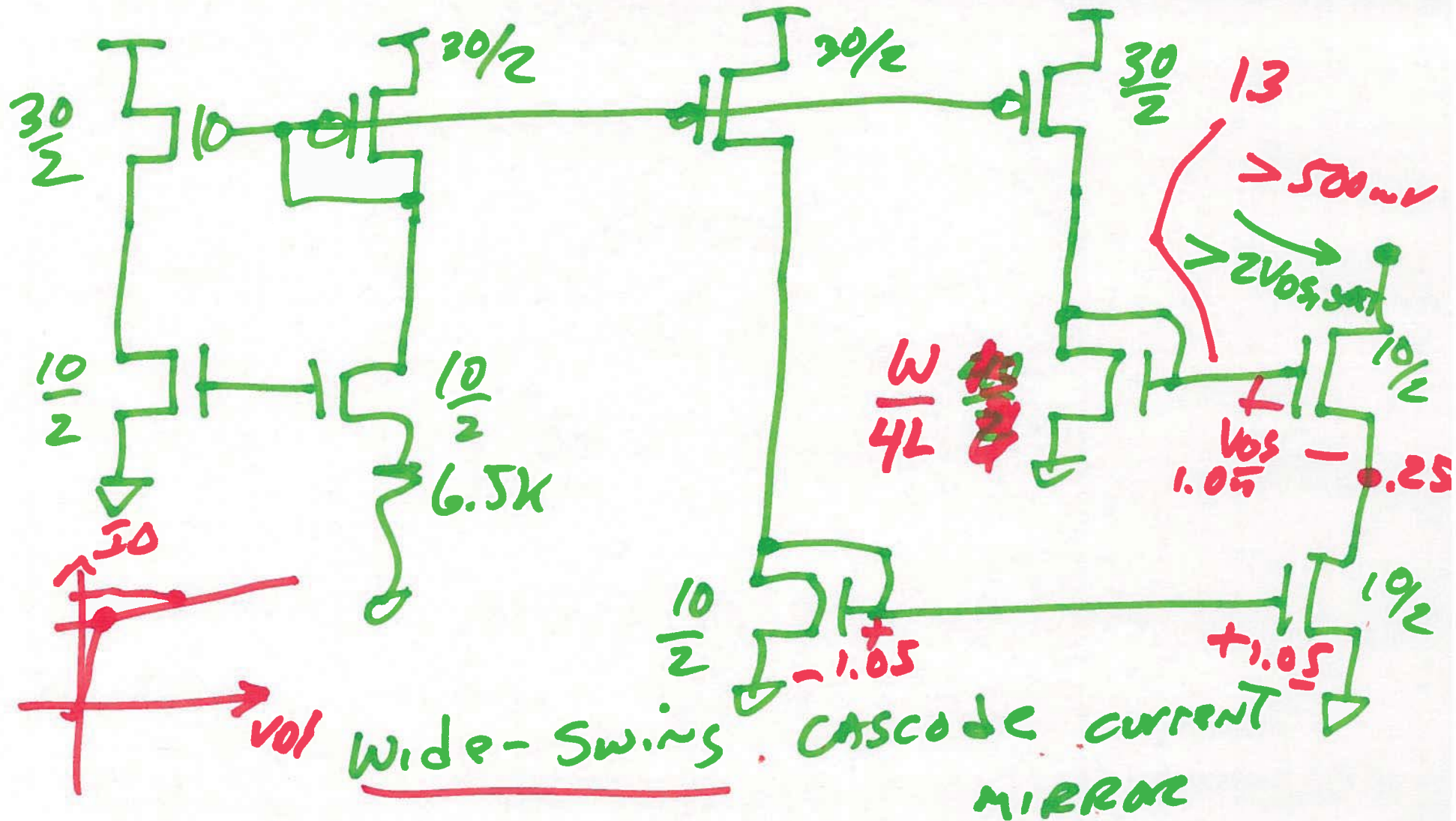
WIDE SWING CASCODE

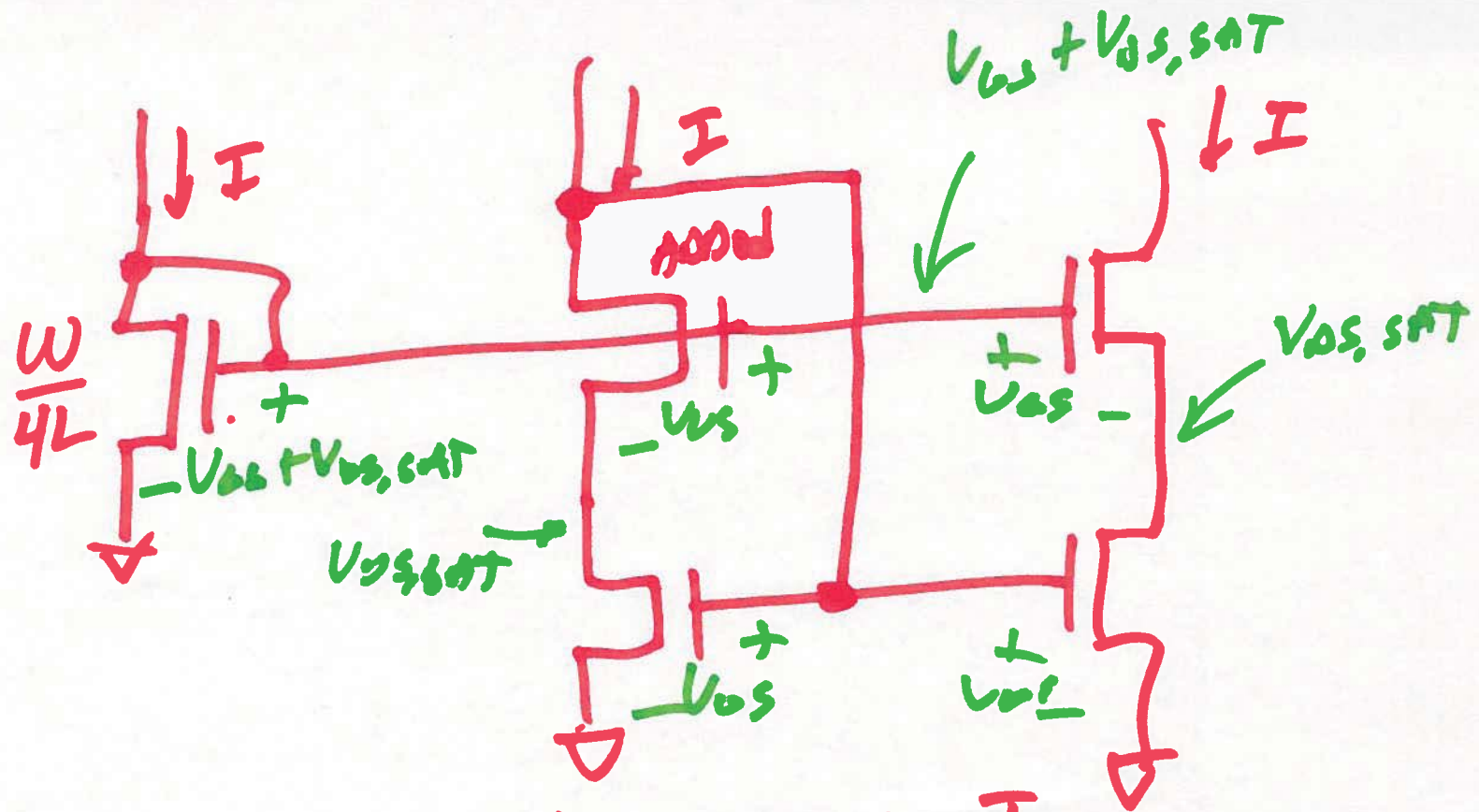


2)



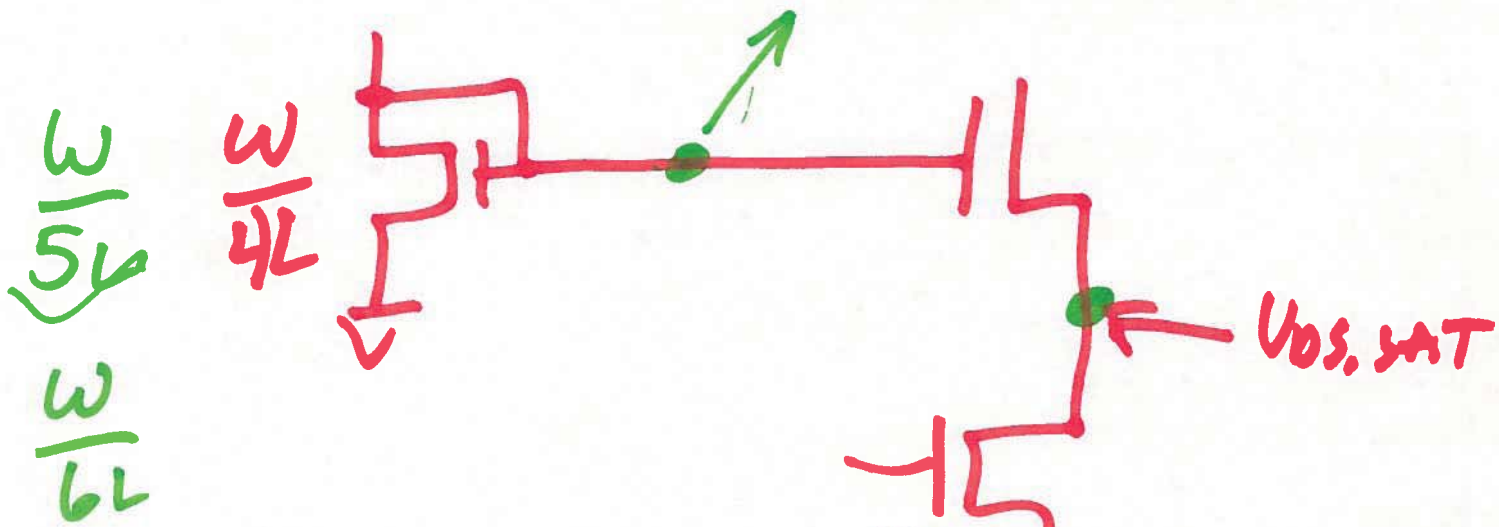
3)





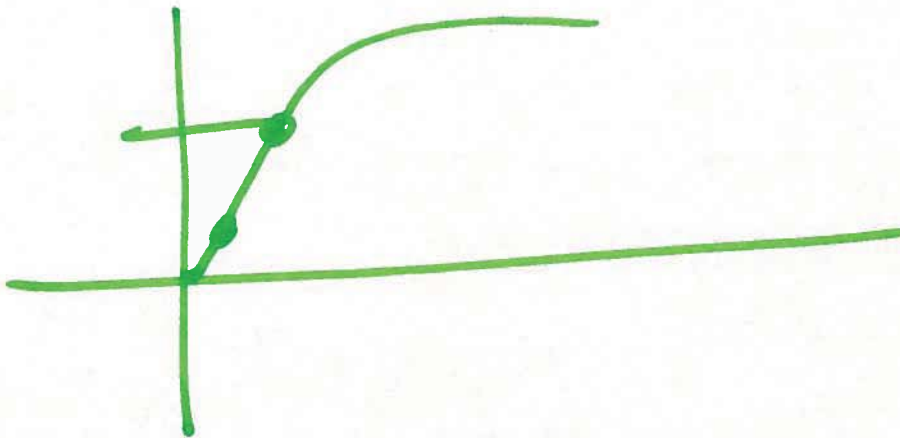
WIDE - SWING CURRENT MIRROR

51



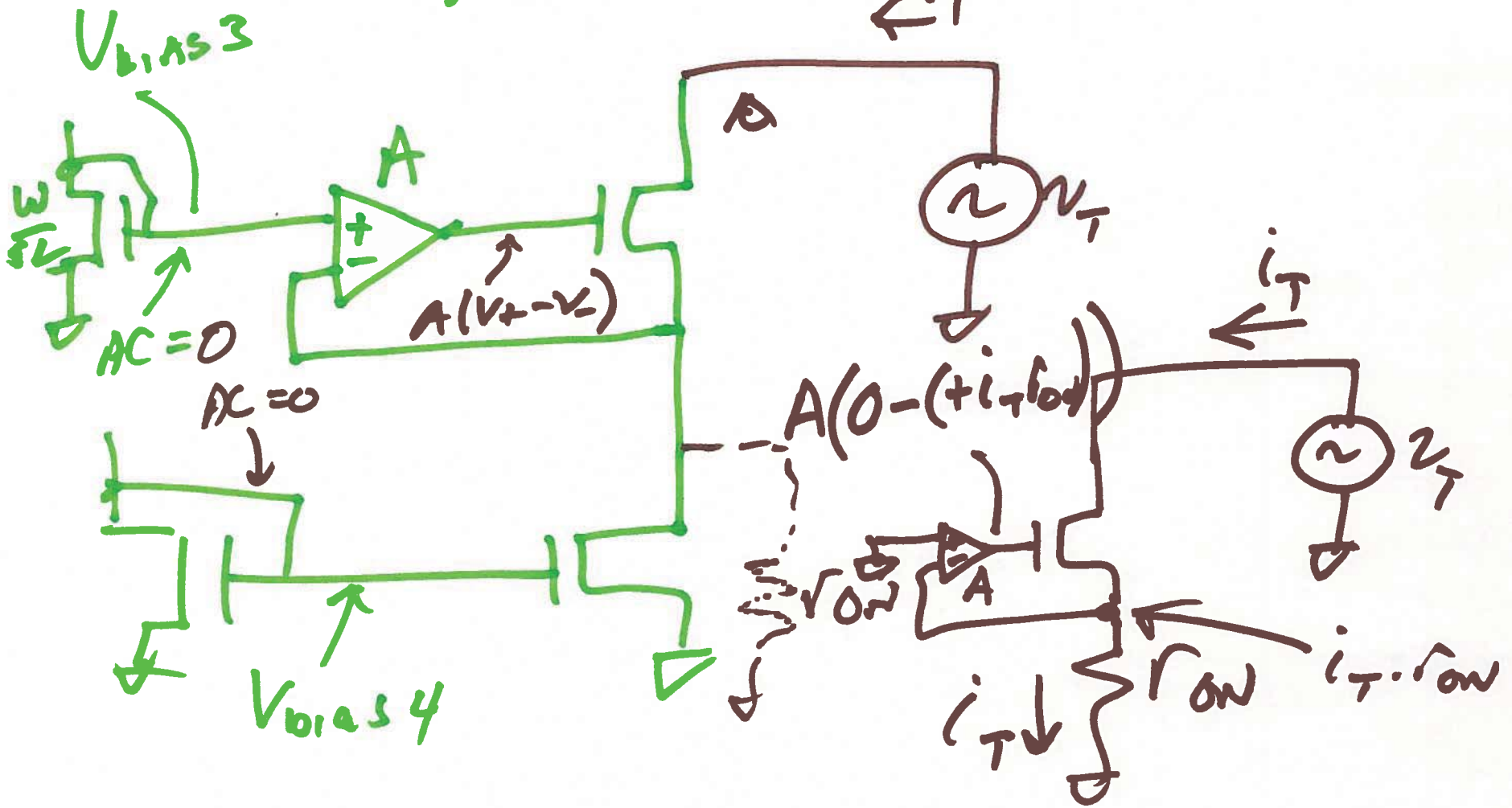
$$I_{REF} = \frac{K_P}{2} \cdot \frac{W}{6L} (V_{DS,6}^{UP} - V_{THN})^2$$

down

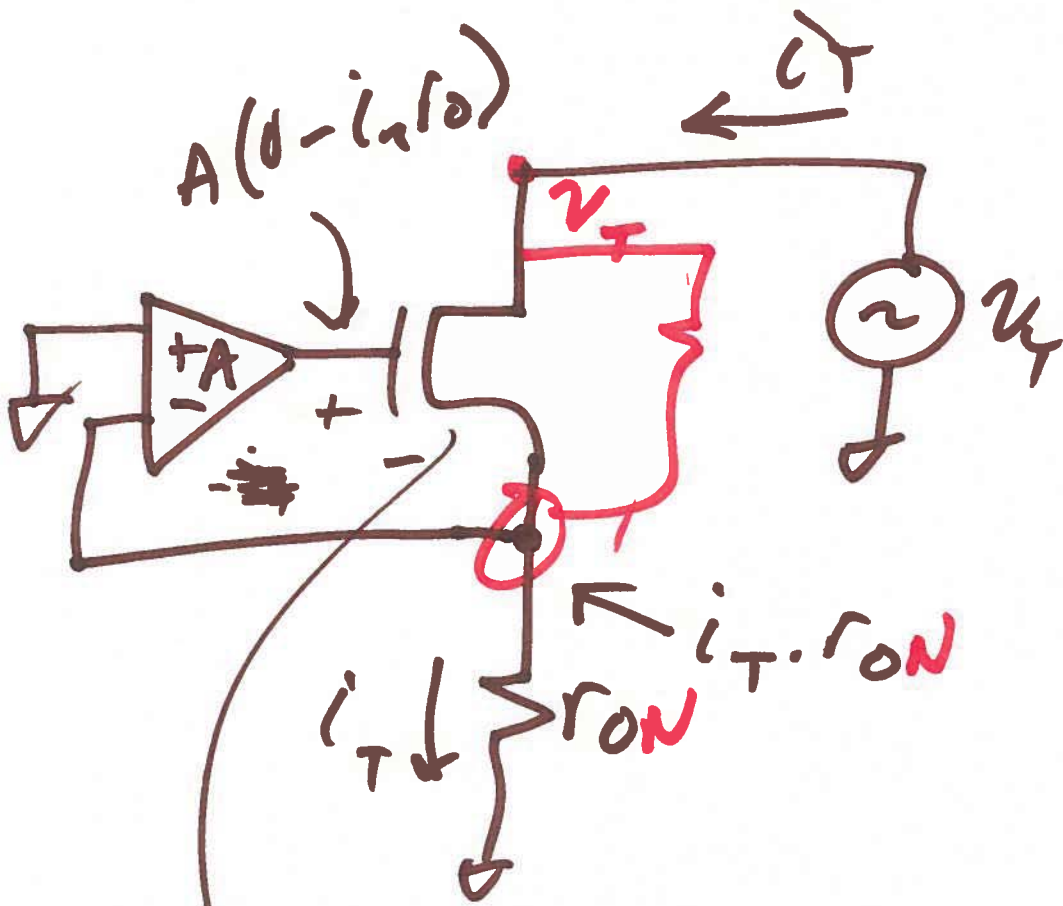


6)

Regulated Drain

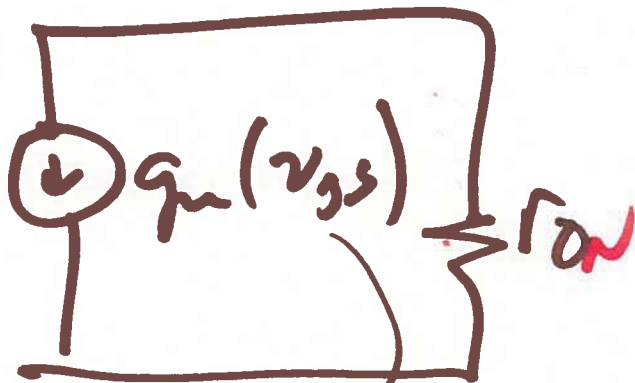


7)



$$i_T \equiv \frac{v_T - i_T r_{ON}}{r_{ON}} + g_m v_{gs}$$

\downarrow
 $(-i_T r_0 (1+A))$



$$-i_T r_0 (1+A)$$

$$A(-i_T r_0) - i_T r_0$$

$$i_T = \frac{v_T - i_T r_{on}}{r_{on}} + g_m (-i_T r_{on} (1+A))$$

$$i_T r_{on} = v_T - i_T r_{on} + g_m r_{on} (-i_T r_{on} (1+A))$$

$$i_T (r_{on} + r_{on} + r_{on}^2 g_m (1+A)) = v_T$$

$$\text{ROUTS} = \frac{v_T}{i_T} = r_{on} (2 + r_{on} g_m (1+A))$$

RES. $\approx g_m r_{on}^2 (1+A)$

draw

CASCODE
 $\approx r_o^2$
 BASIC MIRROR
 r_o