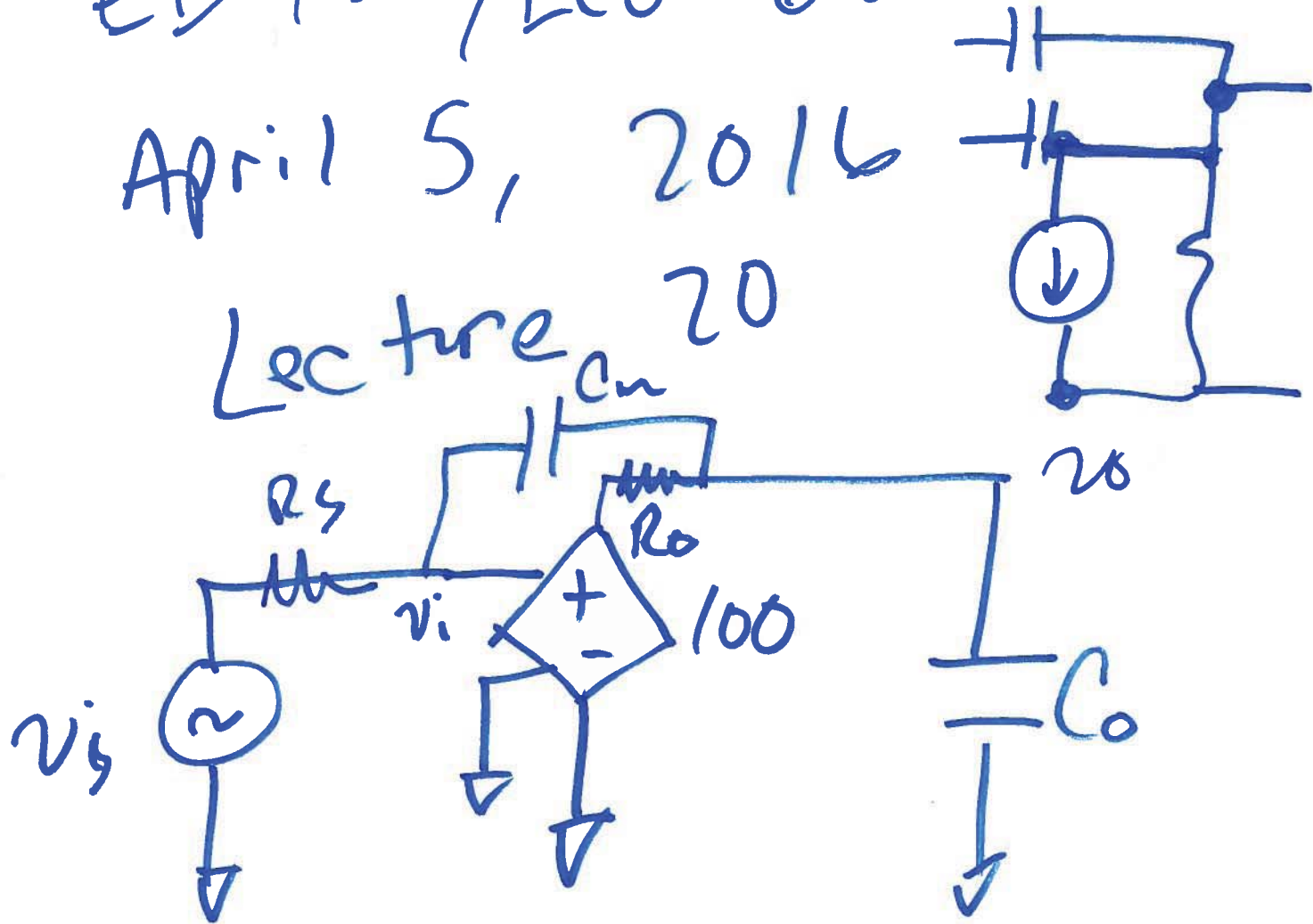
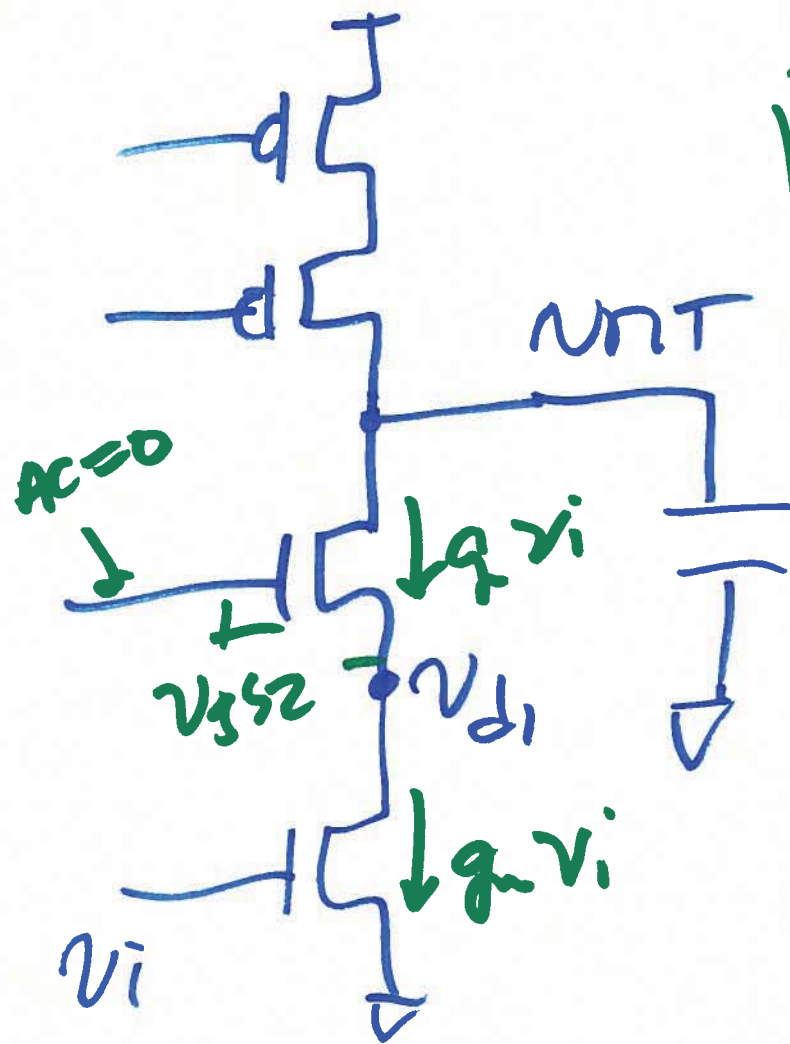


EE 420 / ECG 620

April 5, 2016

Lecture 20





$$\frac{v_{d1}}{v_i} = -1$$

$$1 \angle 180^\circ$$

$$g_m v_i = g_m v_{SS2}$$

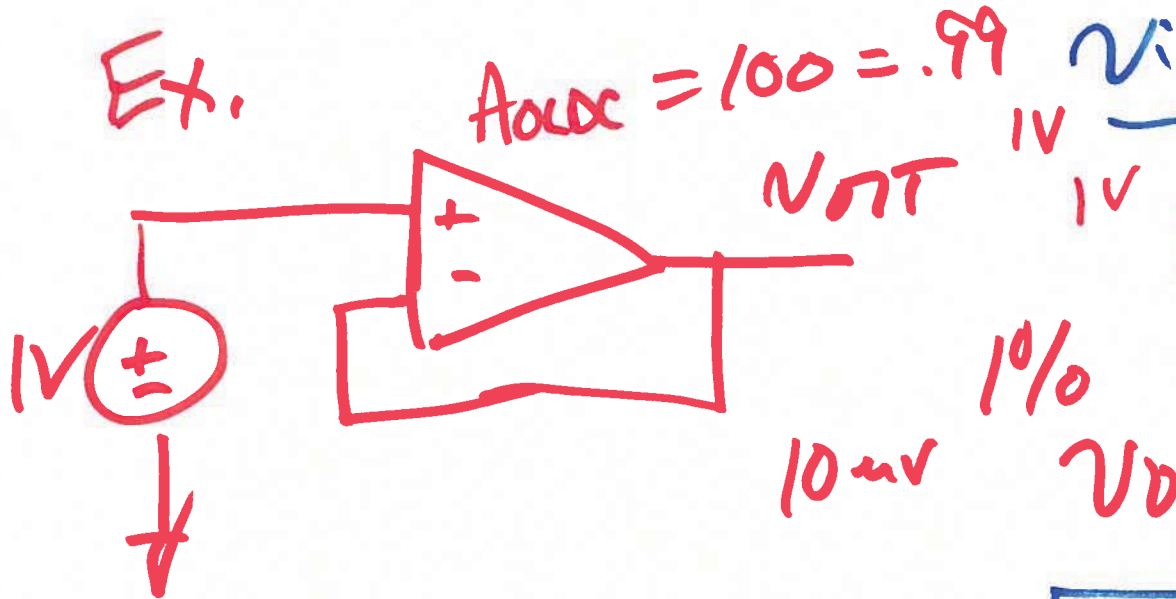
$$g_m v_i = g_m (0 - v_{d1})$$

$$V_{OUT} = -g_m v_i \cdot$$

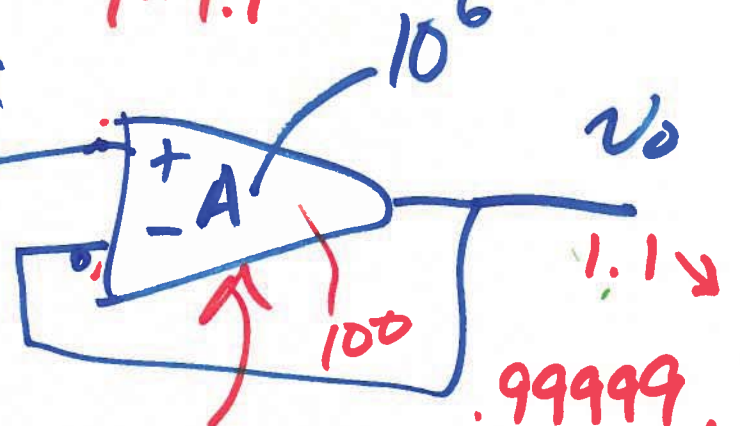
$$v_{d1} = -v_i$$

Diff - Amps

Ex.



$$1 - 1.1 = -.1 - 10^5$$



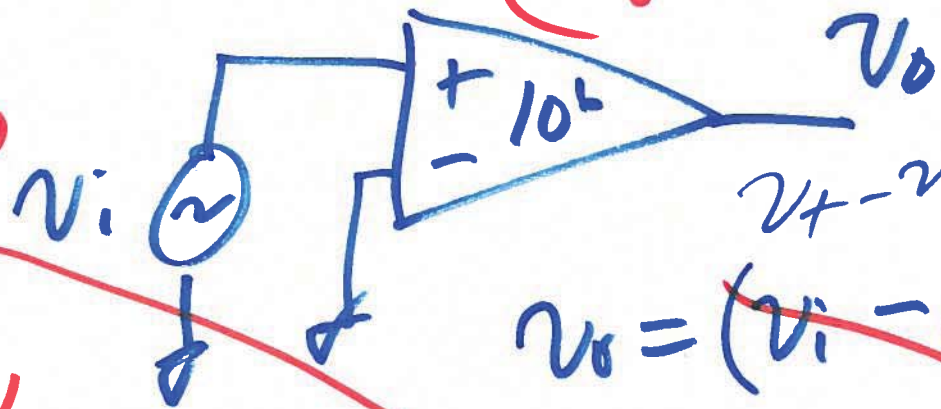
$$10\% \quad 10\mu V$$

$$V_o = (V_i - V_o) \cdot 10^6$$

$$V_{out} = (1 - V_{out}) \cdot 100$$

$$V_{out} = \left(\frac{100}{100 + 1} \right) 101$$

$$= \frac{100}{.9}$$



$$V_o = (V_i - 0) \cdot 10^6$$

$$V_{NT} + 100V_{NT} = 100$$

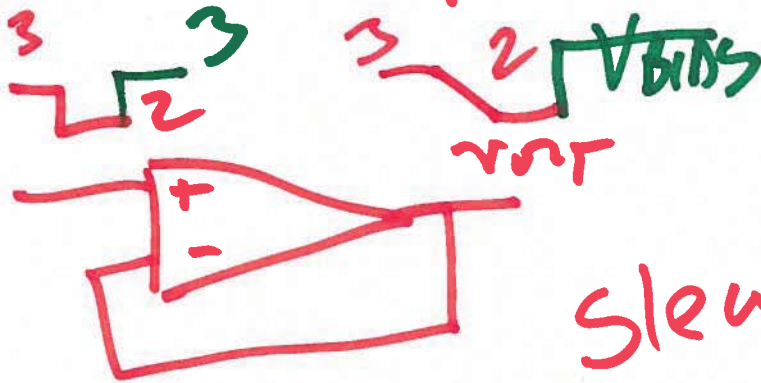
$$V_{NT} = \frac{100}{101}$$

$$I_{bias} = 10 \mu A$$

$$C_c = 10 pF$$

$$\frac{I_{bias}}{C_c} = \frac{10 \cdot 10^{-6}}{10 \cdot 10^{-12}}$$

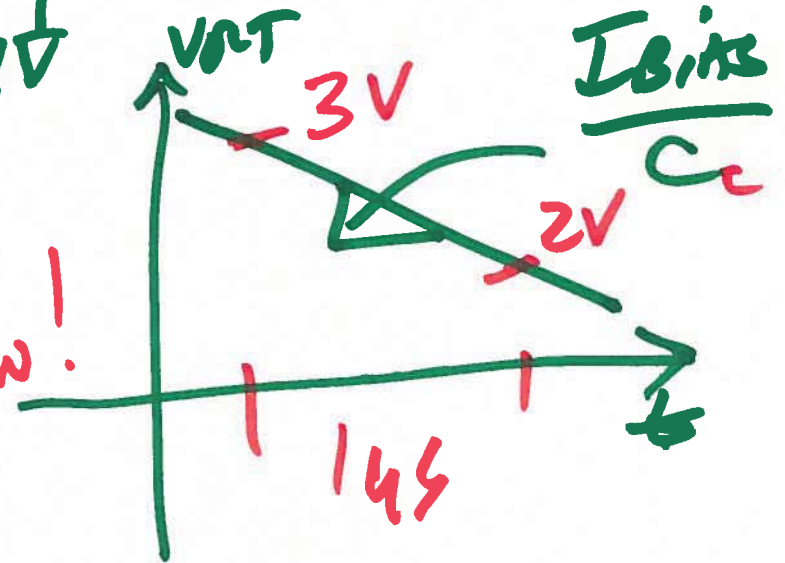
$$= \frac{1V}{1\mu s}$$



Slew-rate limitation!

$$I = C \frac{dv}{dt}$$

$$\frac{I_{bias}}{C_c} = \frac{dv_{out}}{dt}$$



6)

TABLE 9.1

MAX INPUT C_{in}R

$$\frac{V_{DD} - 2V_{SD,SAT} - V_{SG}}{\text{MIN INPUT C}_{in}R}$$

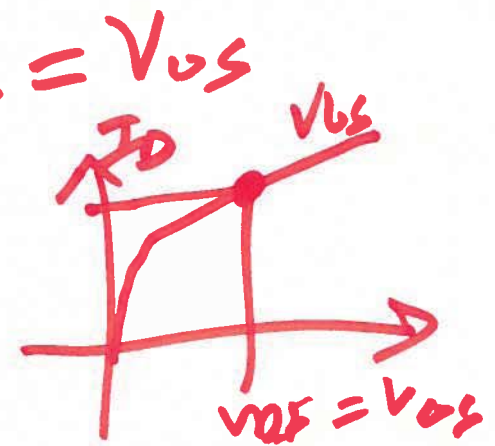
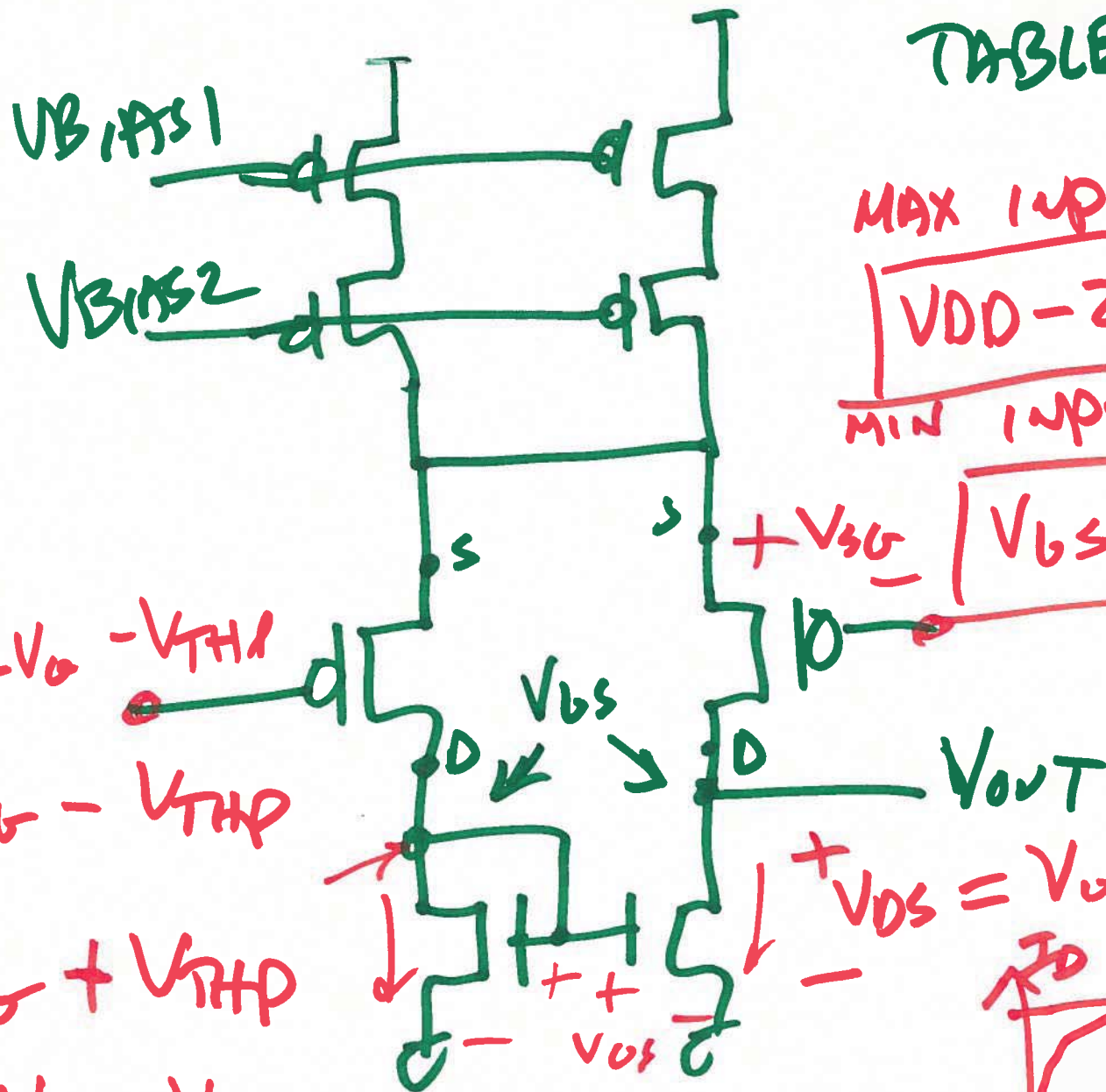
$$\boxed{+V_{SG} \mid V_{GS} - V_{THP}}$$

$$V_S - V_D \geq V_S - V_G - V_{THP}$$

$$V_{SD} \geq V_{SG} - V_{THP}$$

$$V_D \leq V_G + V_{THP}$$

$$V_G \geq V_D - V_{THP}$$

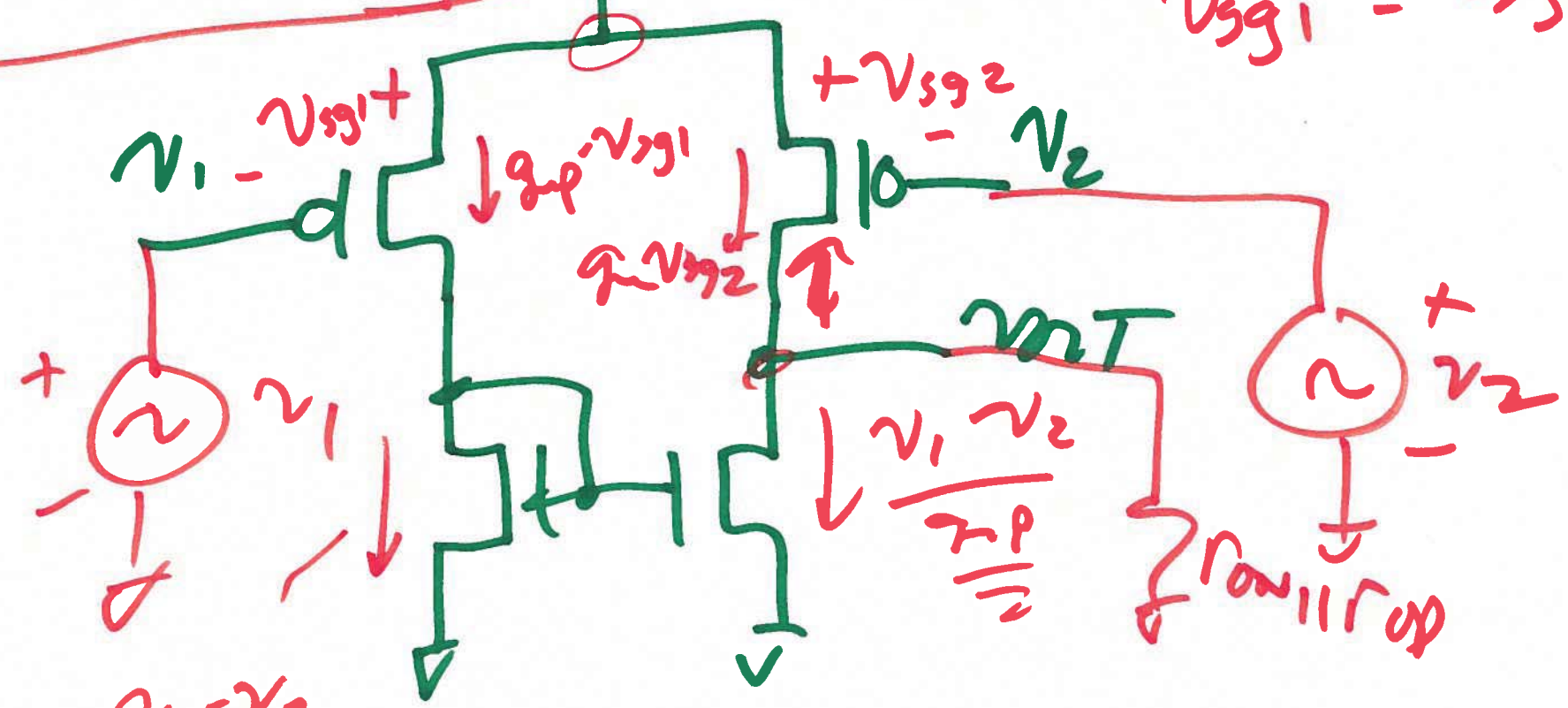


$$\frac{mT}{v_1 - v_2} = g_{mp} \cdot r_{on} || r_{op}$$

$\downarrow i = 0$

$g_{mp} v_{sg1} + g_{mp} v_{sg2} = 0$

$v_{sg1} = v_{sg2}$



$$\frac{v_1 - v_2}{g_{mp}/2}$$

$$v_1 + v_{sg1} - v_{sg2} - v_2 = 0$$

$$v_1 - v_2 = -2v_{sg1} = -2 \frac{1}{g_{mp}}$$

Q)