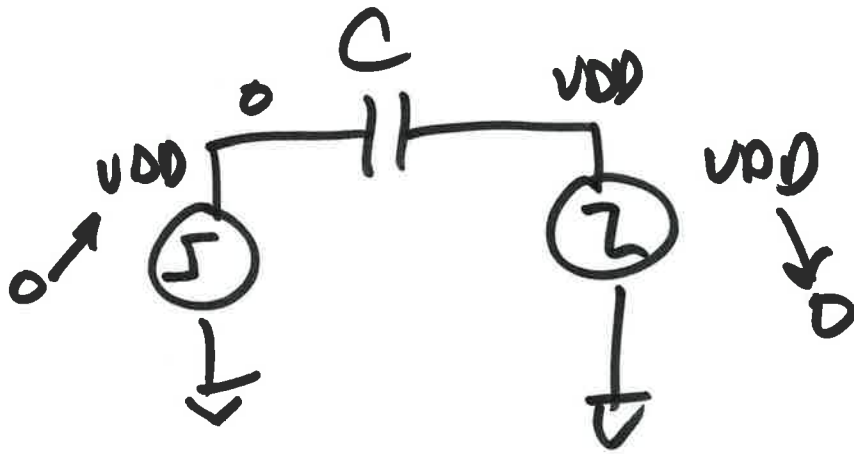


Review Digital Model

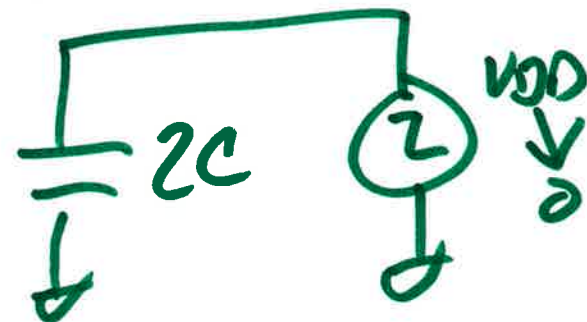
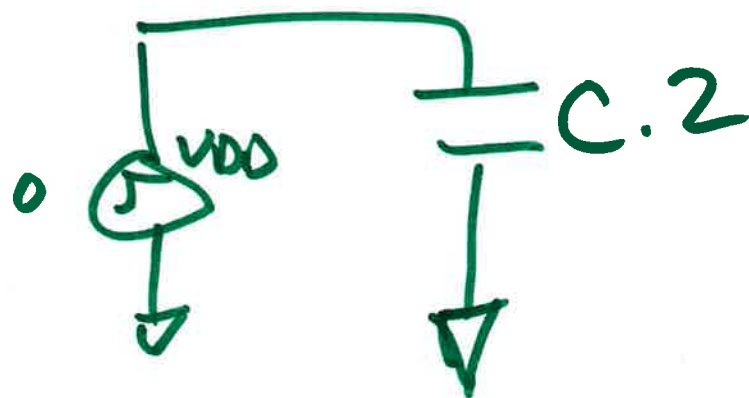
1/26/11



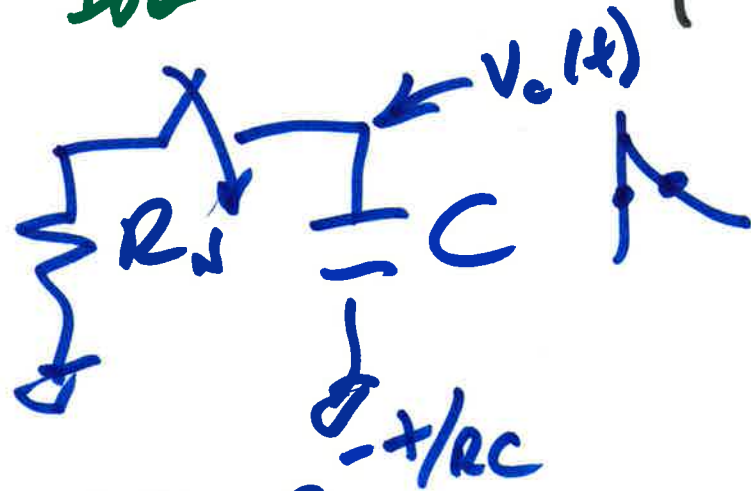
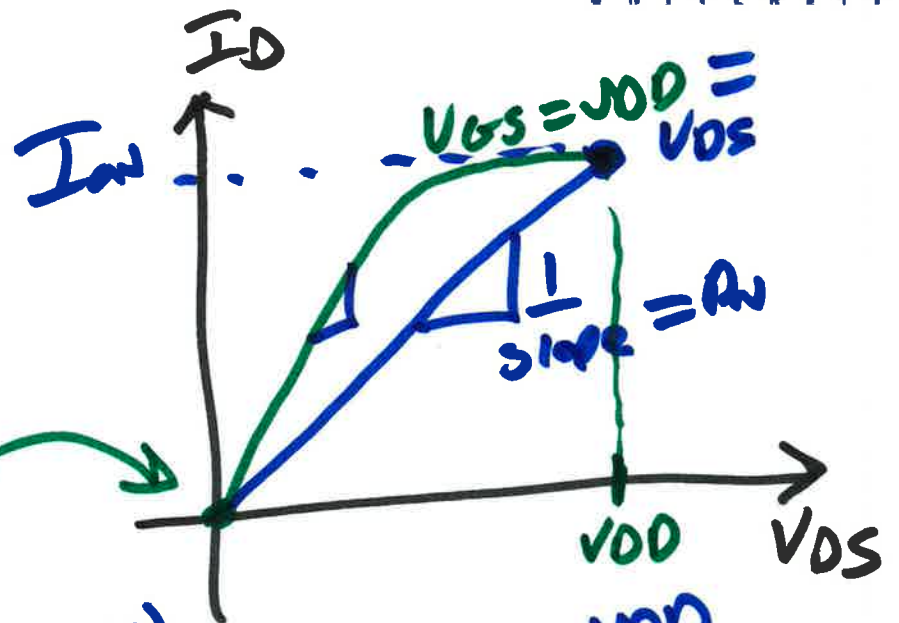
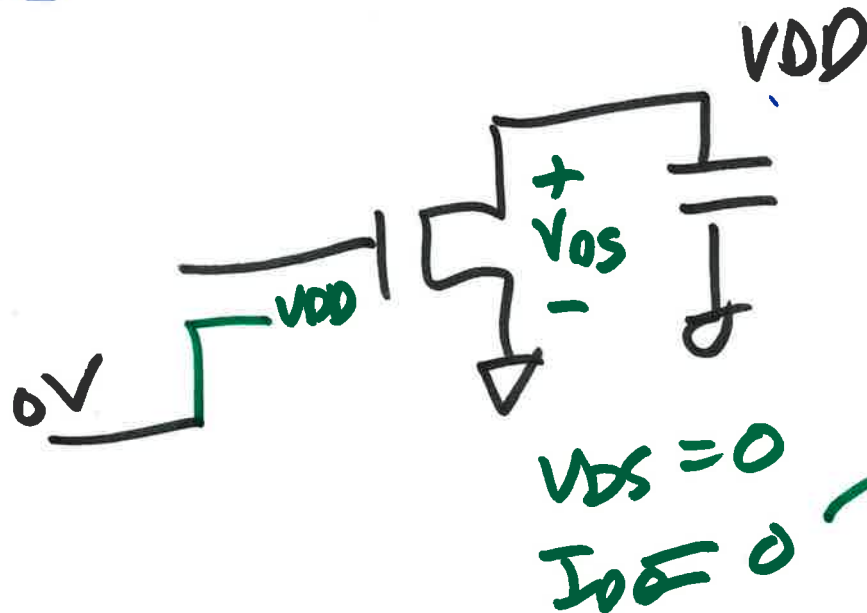
$$Q_{initial} = (0 - VDD)C = -VDD \cdot C$$

$$Q_{final} = (VDD - 0)C = VDD \cdot C$$

$$-Q_{initial} + Q_{final} = 2VDDC$$



1)



$$R_D = \frac{V_{DD}}{I_{DQ}}$$

$$R_D = R_i' \cdot \frac{L}{W}$$

$$R_i' \approx 20k$$

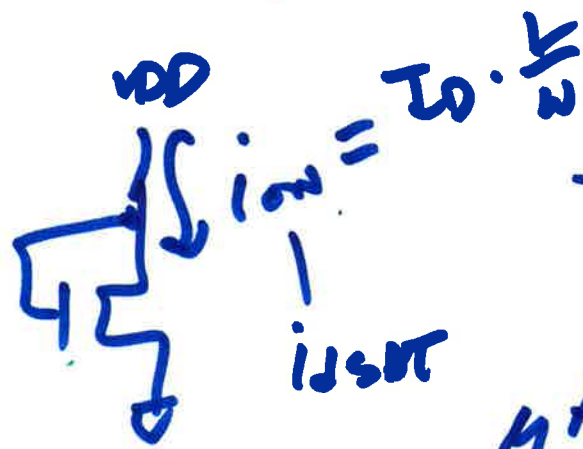
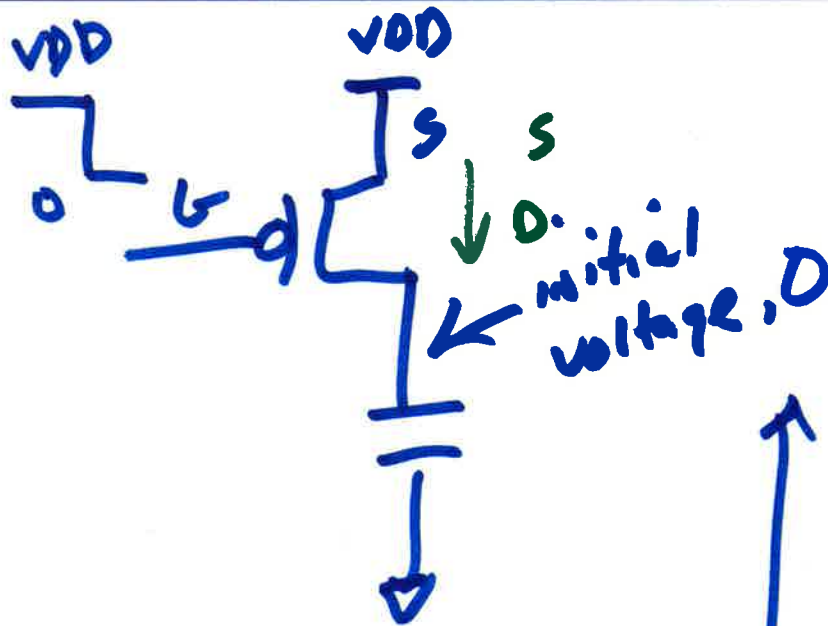
$$R_D' = 40k$$

$$V_c(t) = V_{DD} \cdot e^{-t/RC}$$

$$\frac{V_{DD}}{2} = V_{DD} \cdot e^{-t/RC}$$

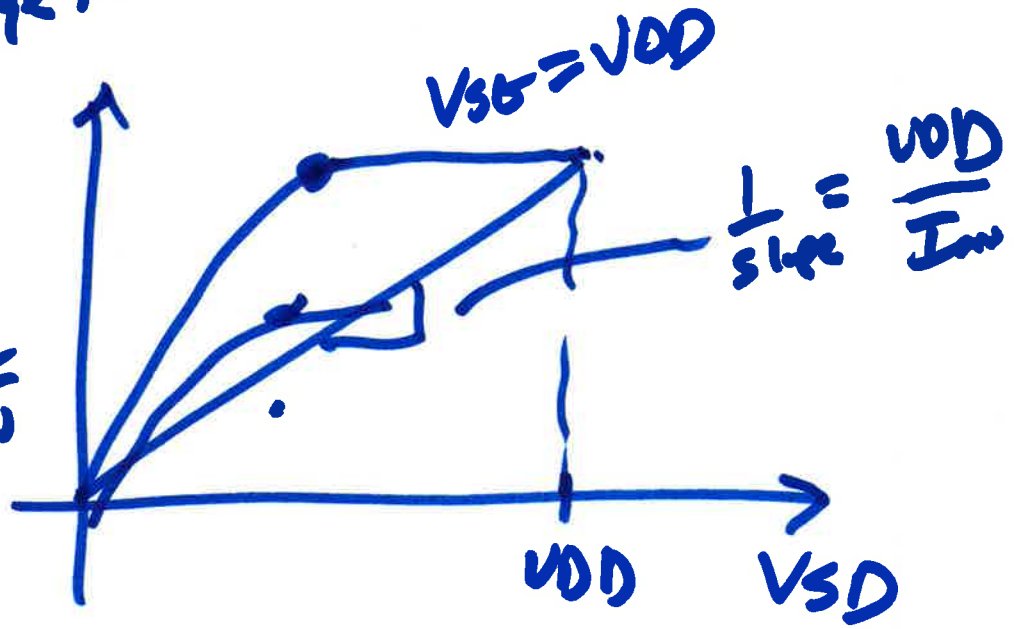
$t_d = 0.7RC$

2)



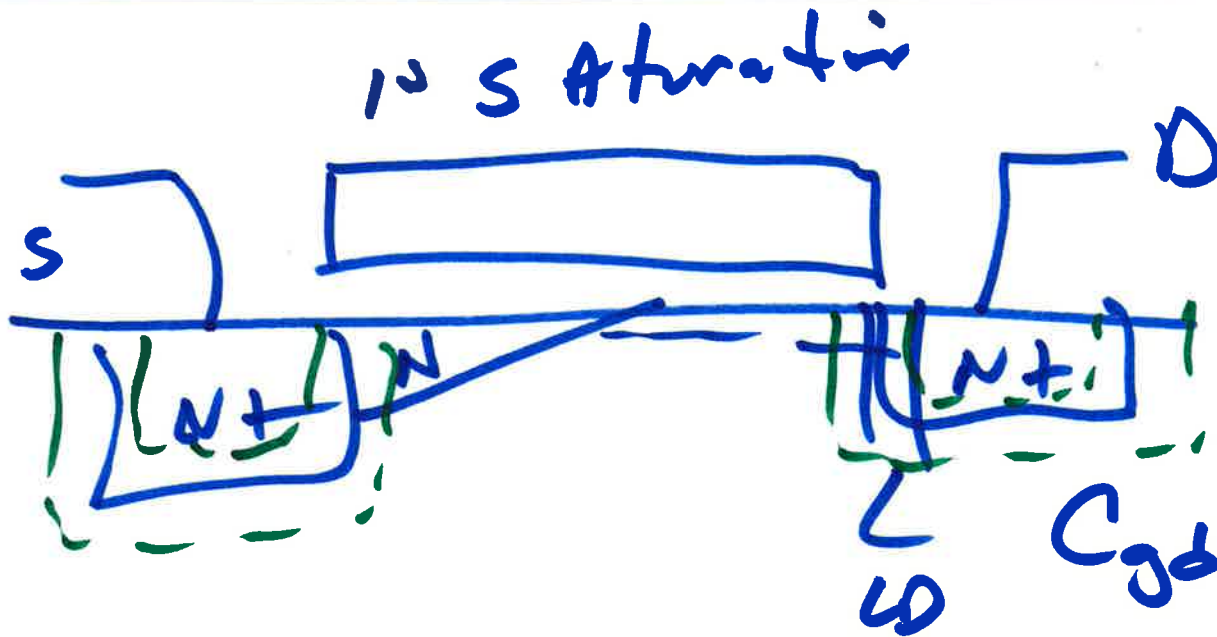
$I_{Dsat} = I_0 \cdot \frac{V}{2}$

$\frac{1 \mu A}{4 \mu m} I_{Dsat}$



3)

CAPACITANCE



$$C_{gd} = C_{ox} \cdot W$$

$$= \frac{\epsilon_{ox} \cdot (L/2) \cdot W}{t_{ox}}$$

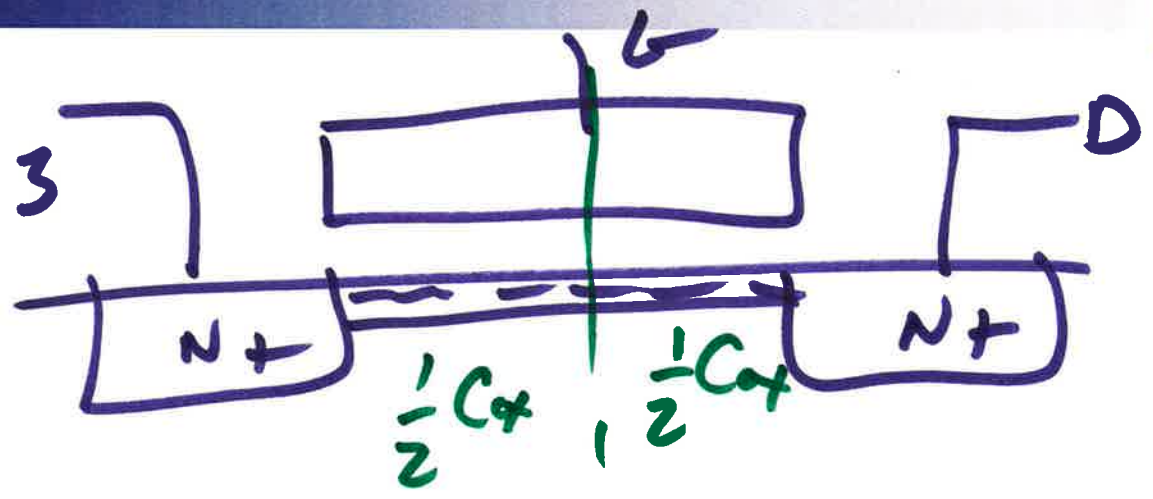
$$C_{gs} = \frac{2}{3} W \cdot L \cdot C_{ox}$$

$$R_s'$$

$$C_{ox}' = \frac{\epsilon_{ox}}{t_{ox}}$$

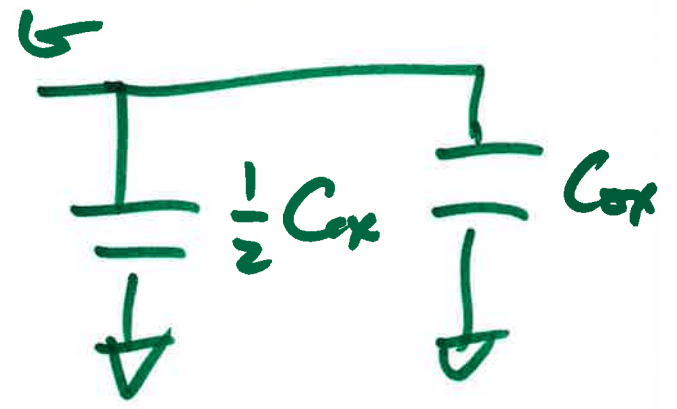
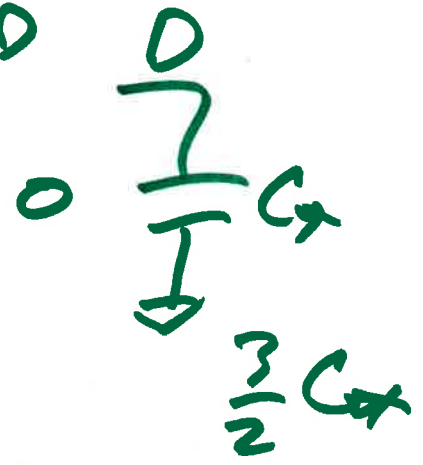
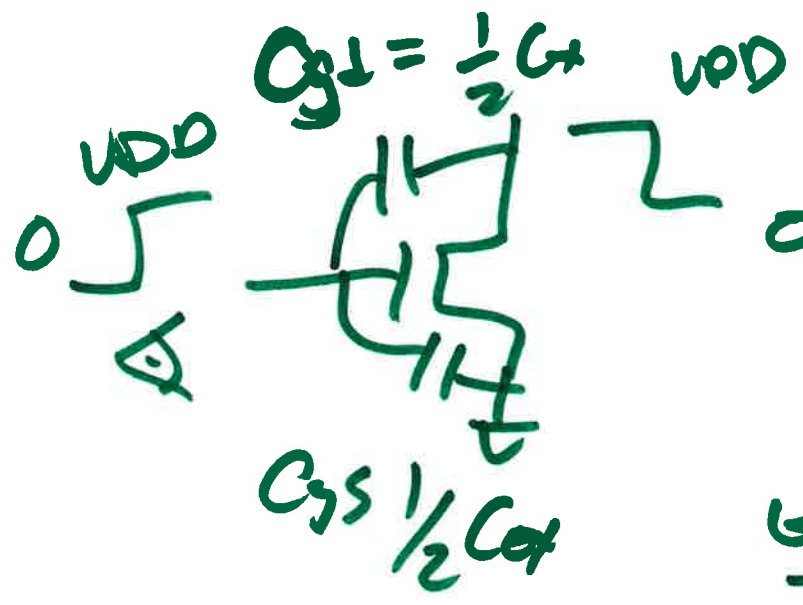
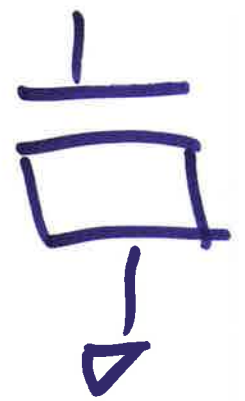
4)

IN triode (ohmic or Linear)

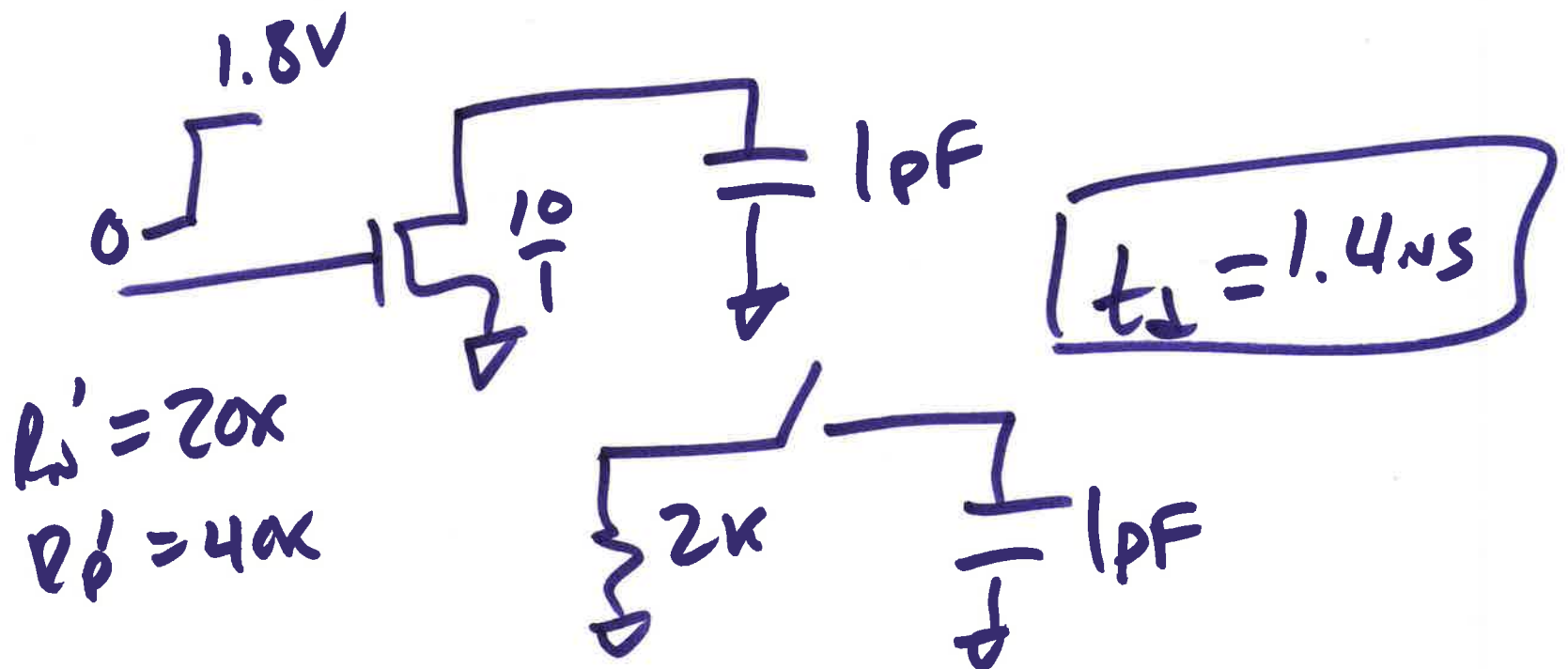
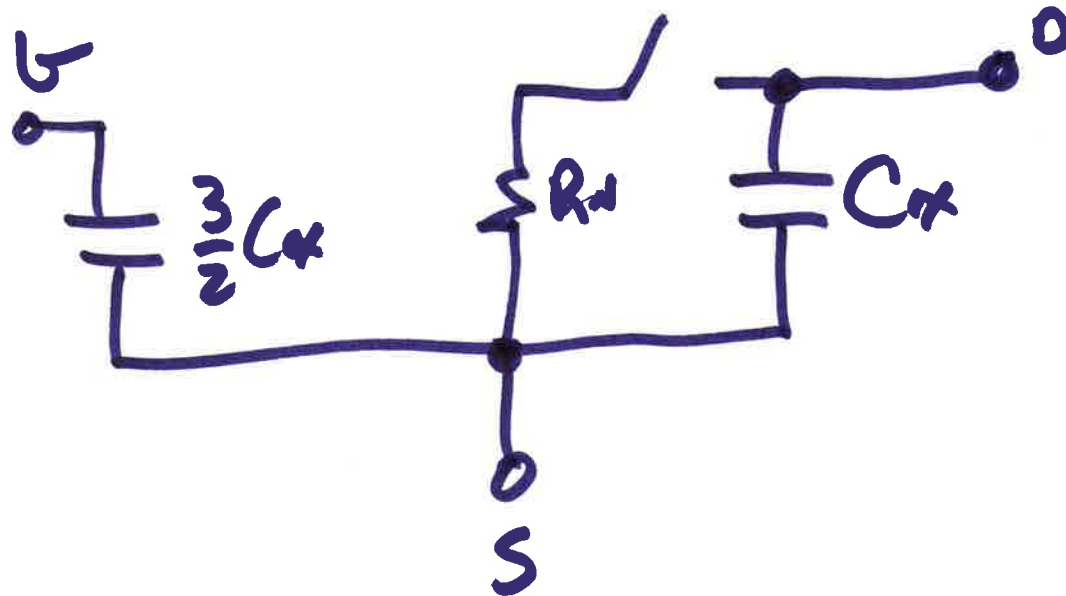


$$C_{ox} = C_{ox} \cdot W \cdot L$$

A



5)



6)

H.W.

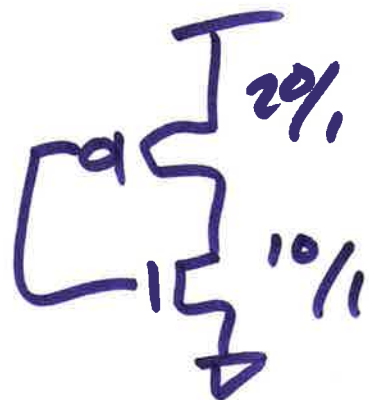
Calculate f_{osc}

for a 51-stage ring osc.

Simulate

Symbol

concise schematic



7)