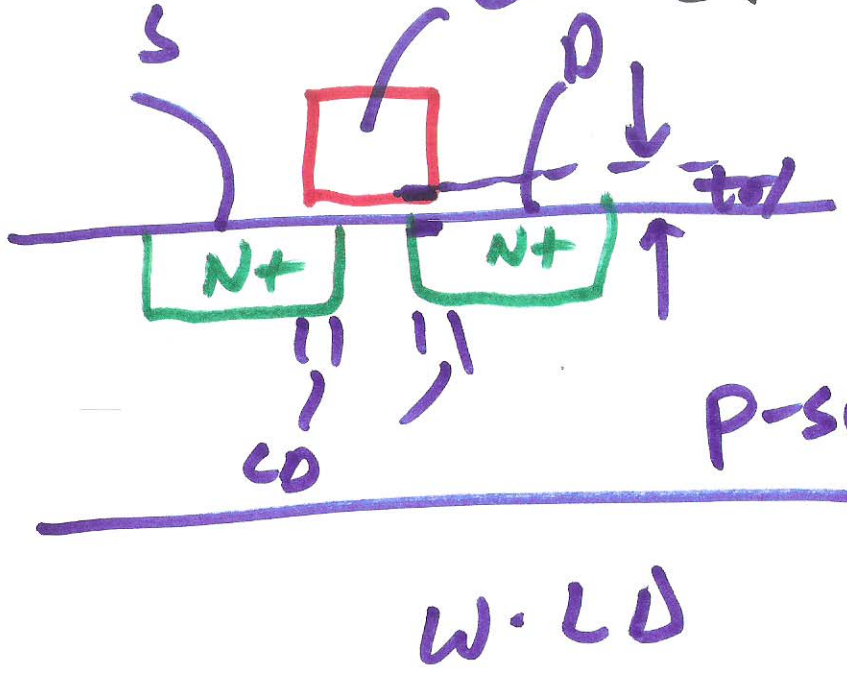
EE 421 / ECG 621

Digital IC Design

OCT. 2, 2013

Lecture 11

$$C = \frac{\epsilon A}{d}$$



C_O

$W \cdot L_D$

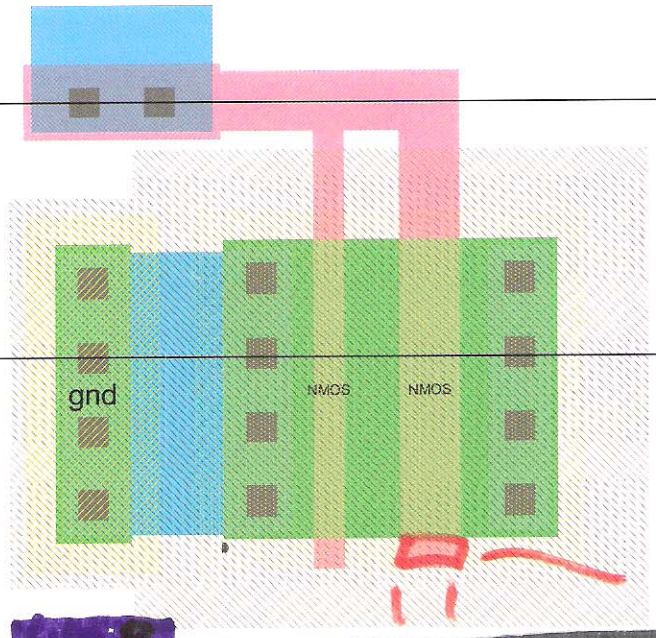
$$C_{gd} = \underbrace{\epsilon_{ox} \frac{L_D}{t_{ox}} \cdot W}_{C_{GDO}} = C_{GSO}$$

Quiz 5, EE 421 and ECG 621
Fall 2013

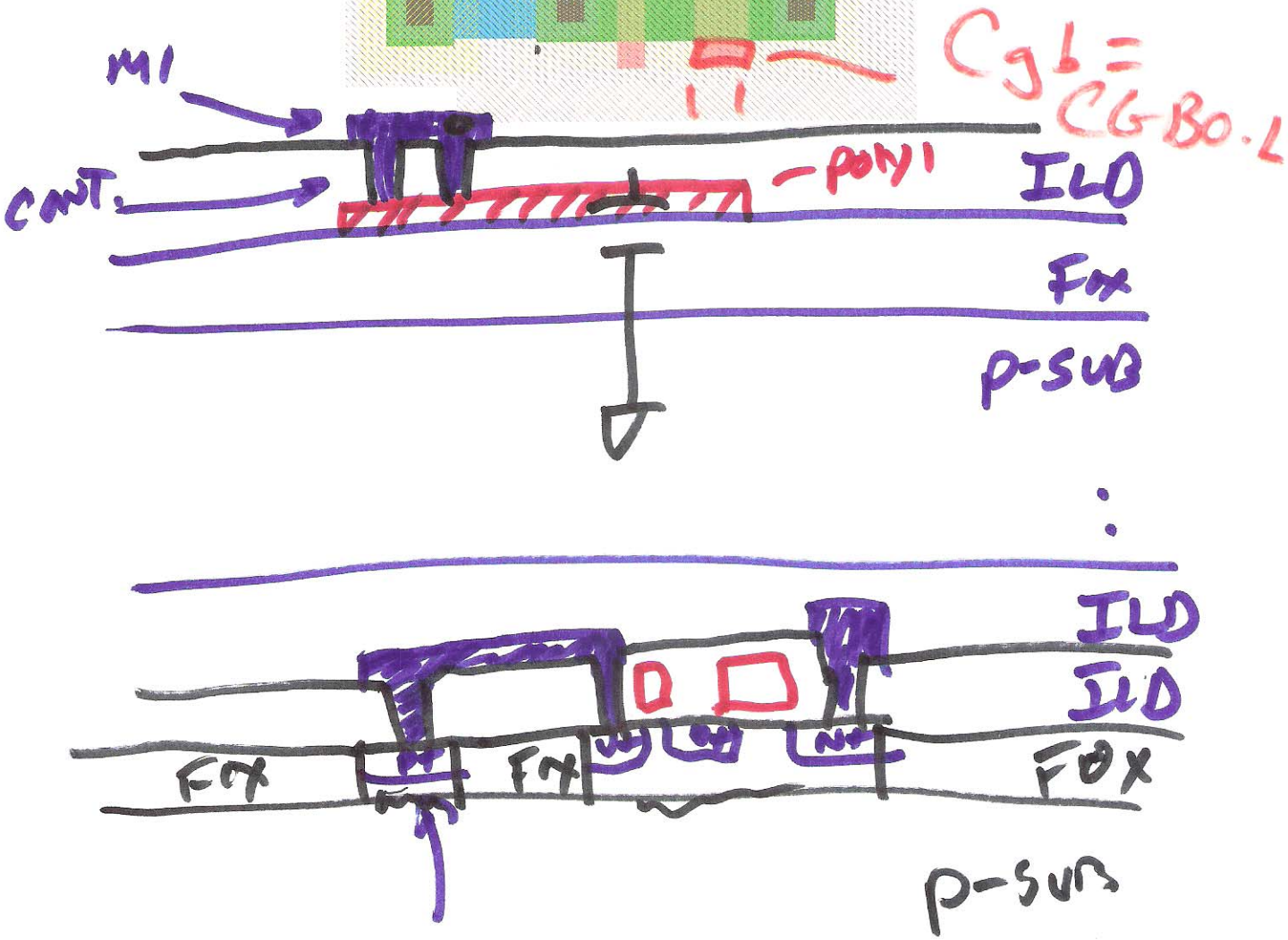
Name:_____

1. Sketch the cross-sectional views associated with the following layout at the places indicated (4 points each).

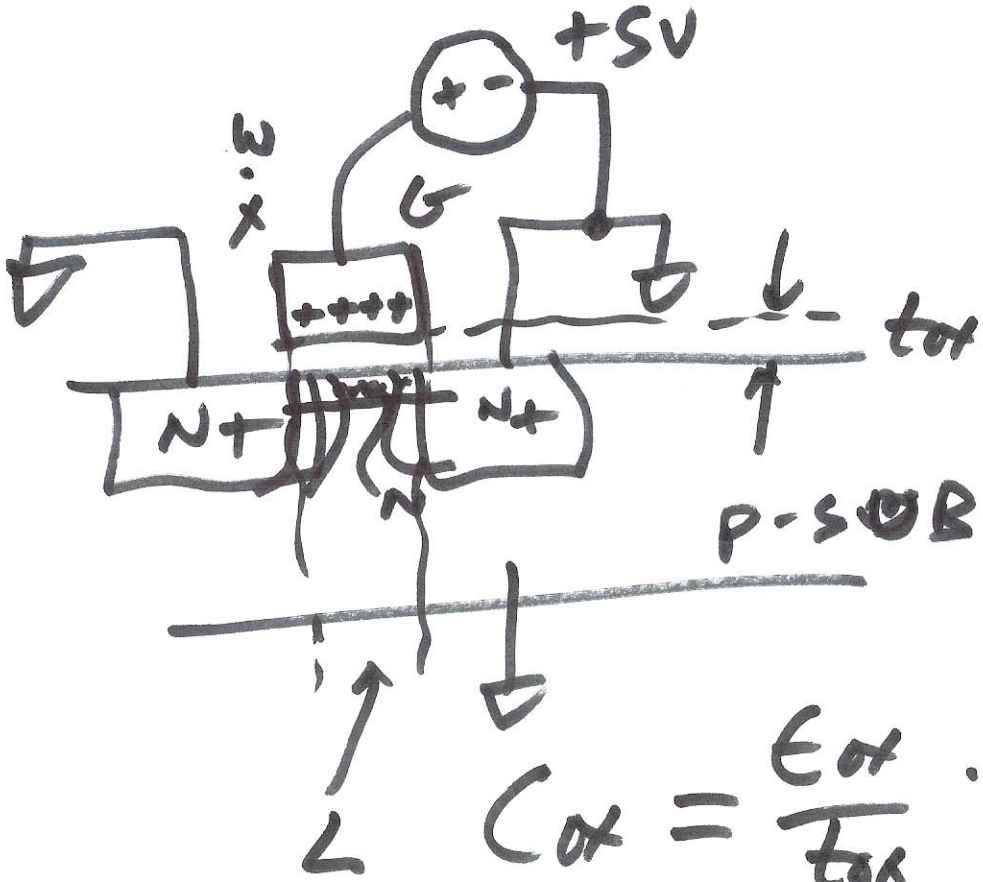
X-sect



X-sect



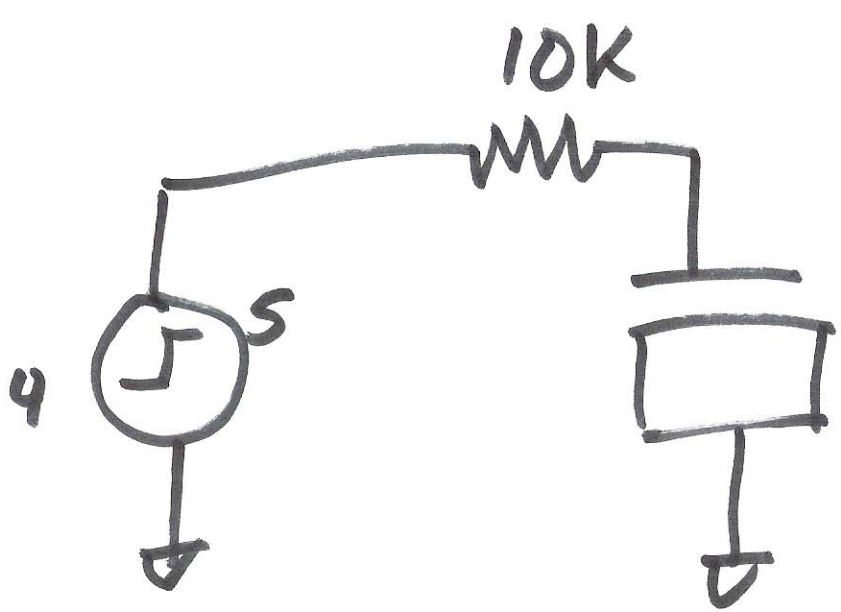
2)



$$C_{ox} = \frac{\epsilon_{ox} \cdot W \cdot L}{t_{ox}}$$

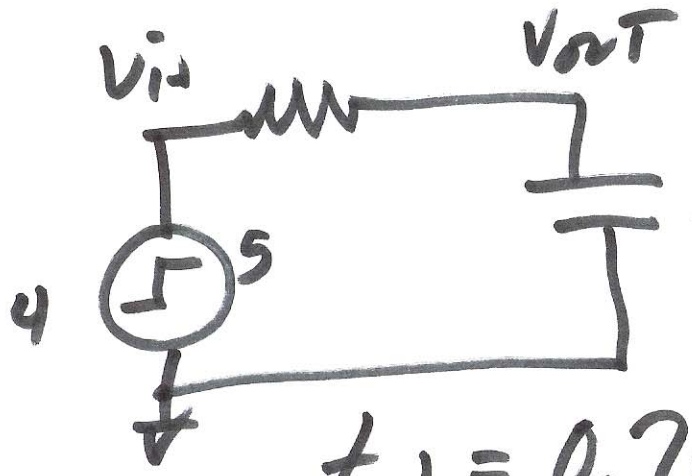
$$C'_{ox} \quad \frac{F}{\mu m^2}$$

$$C_{ox} = C'_{ox} \cdot W \cdot L$$



$C_{ox} = C_{ox}' \cdot 3_4 \cdot 3_4$

$\frac{10}{10} \rightarrow \frac{W}{L}\ \frac{3_4}{3_4}$



$3.3 \cdot 2.5$

$22.5fF$

$C_{ox}' = \frac{\epsilon_{ox}}{t_{ox}} = \frac{3.9\epsilon_0}{t_{ox}}$

$= \frac{(3.9)\cdot(8.85\ aF/\mu m)}{0.0139\ \mu m}$

$C_{ox}' = 2.5fF/\mu m^2$

$t_d = 0.7RC$

$= 0.7 \cdot 10K \cdot 22.5\,fF$

$\simeq 150\,ps$

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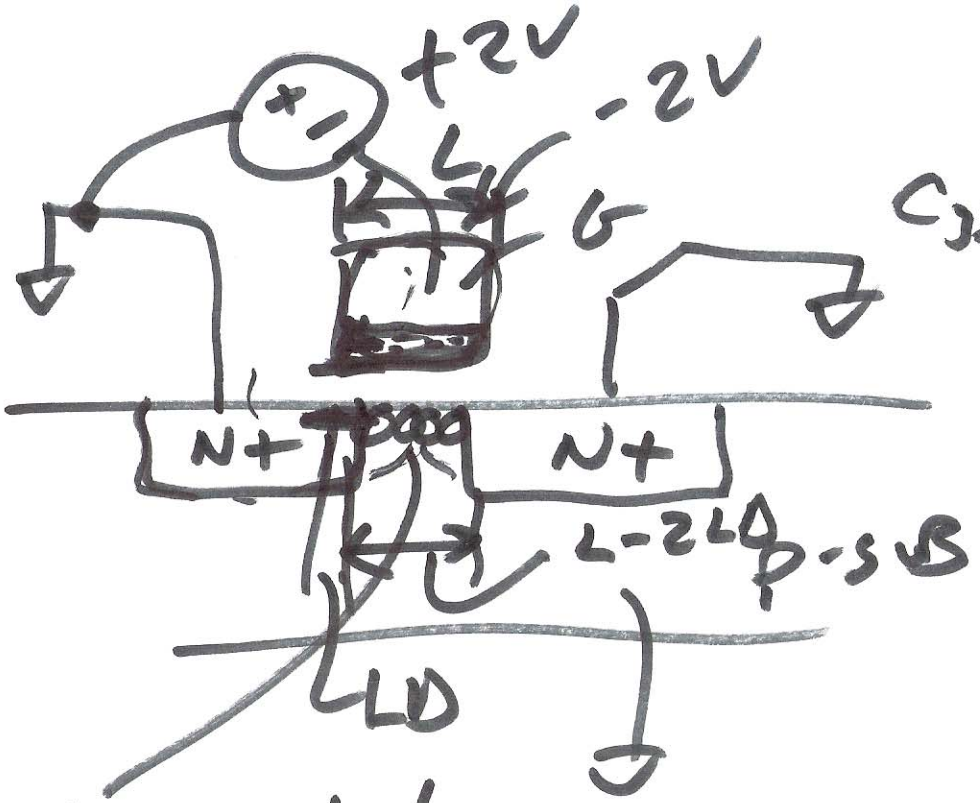
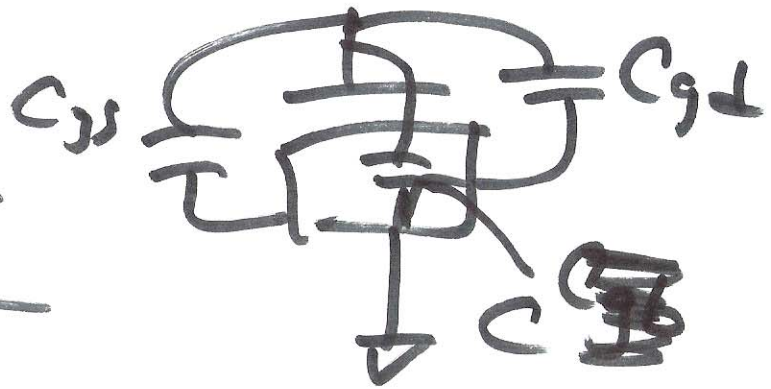
4)



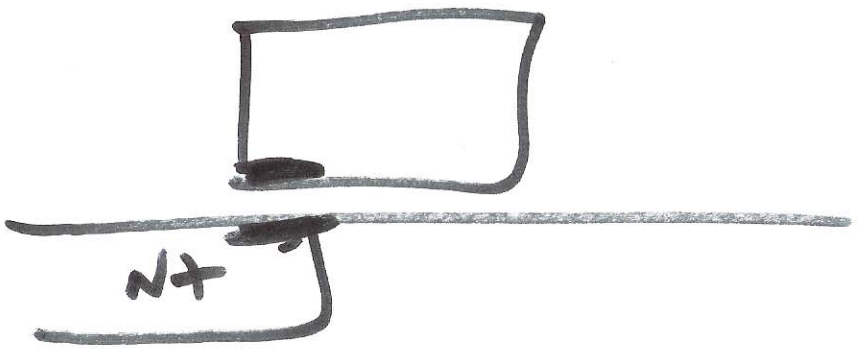


C_{gd} C_{gs}

$$C_T = \frac{\epsilon_{ox}}{t_{ox}} \cdot LD \cdot W + \frac{\epsilon_{ox}}{t_{ox}} \cdot LD \cdot W$$

$$= + \frac{\epsilon_{ox}}{t_{ox}} \cdot (L - 2LD) \cdot W$$

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



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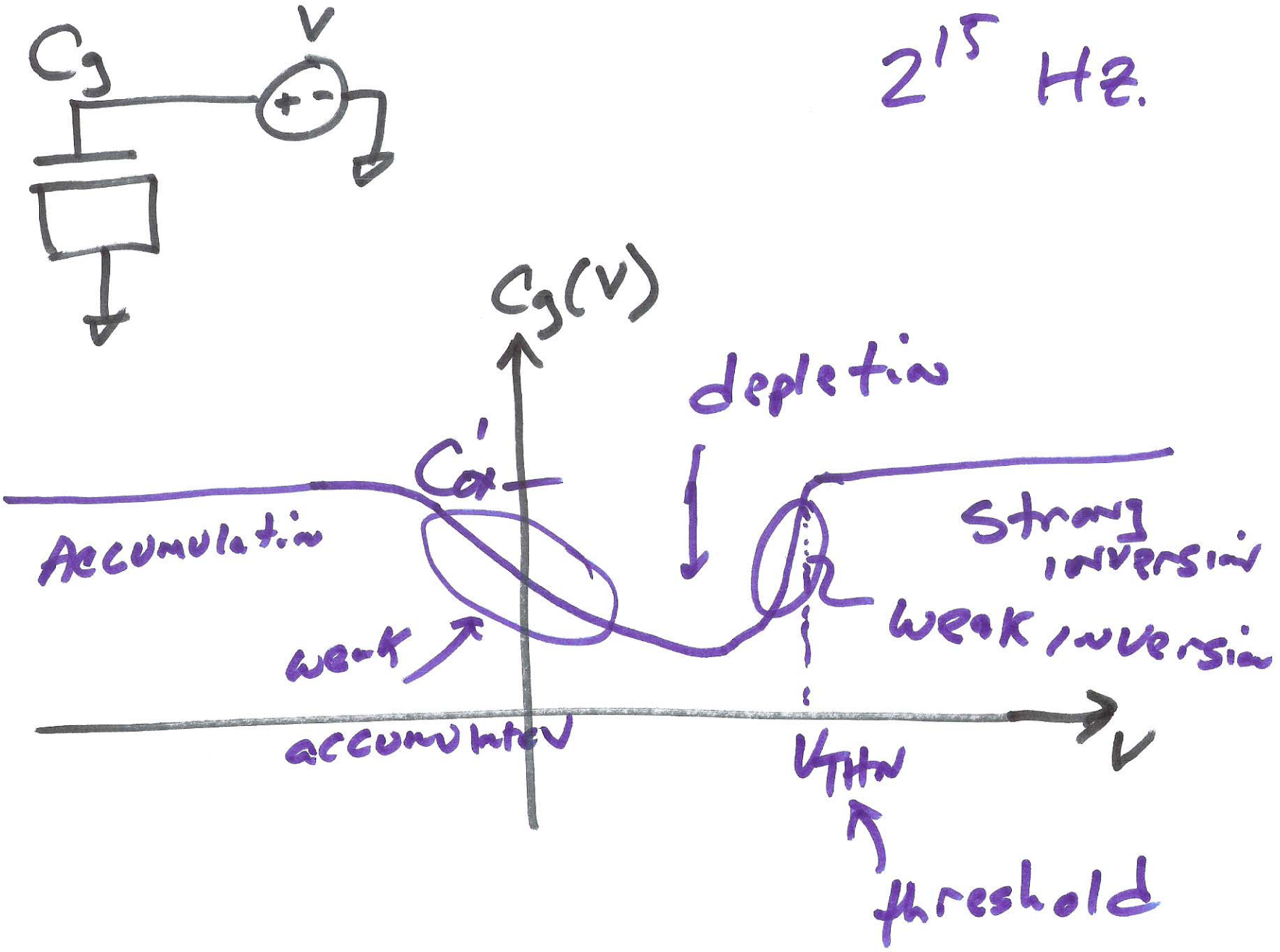

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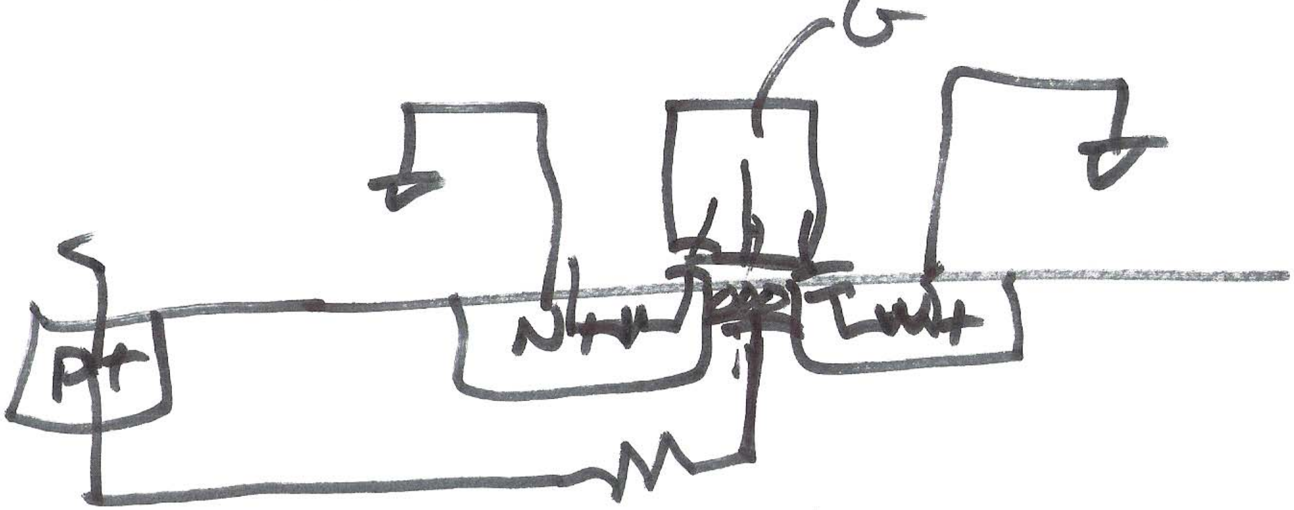
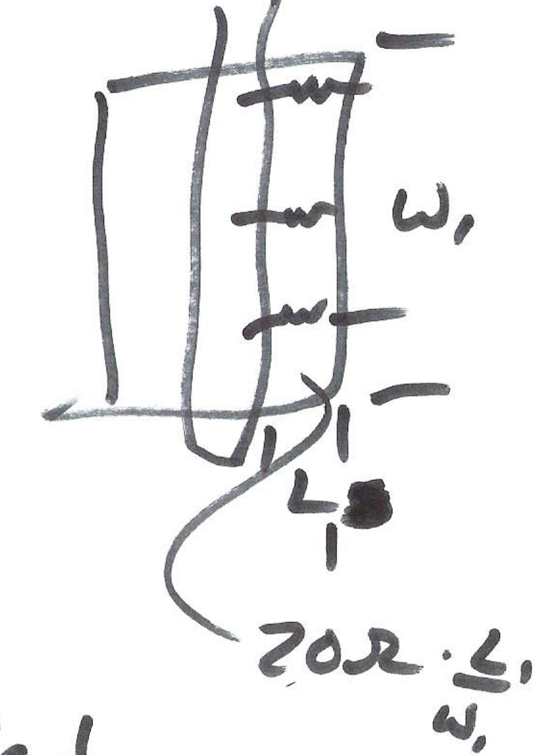
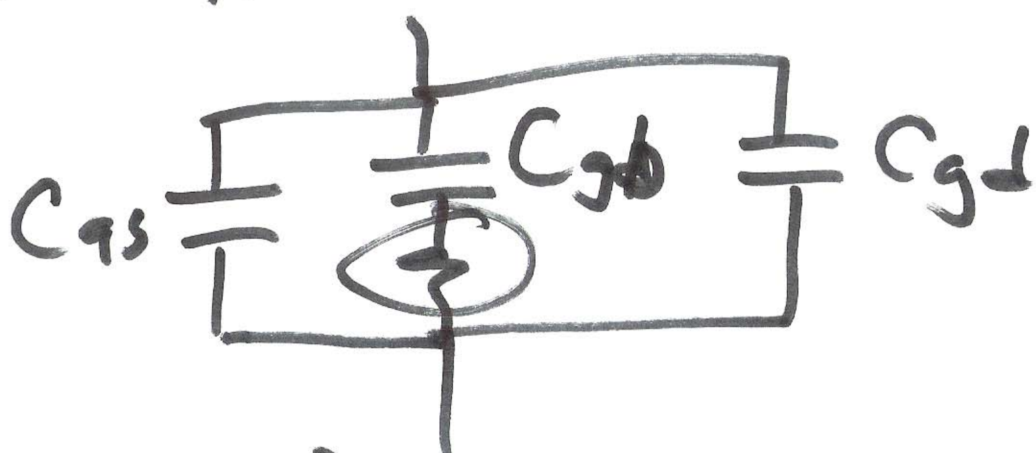
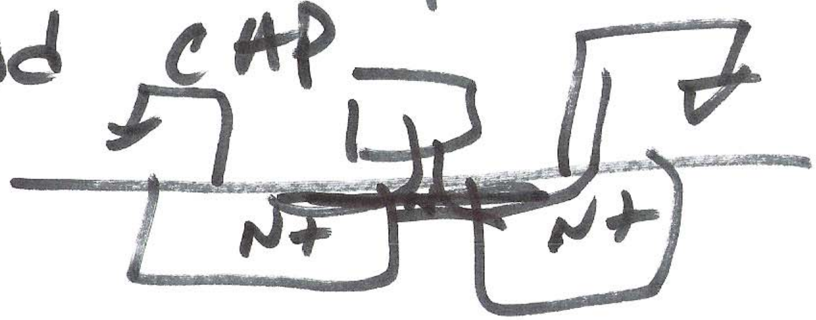
Bad CAP

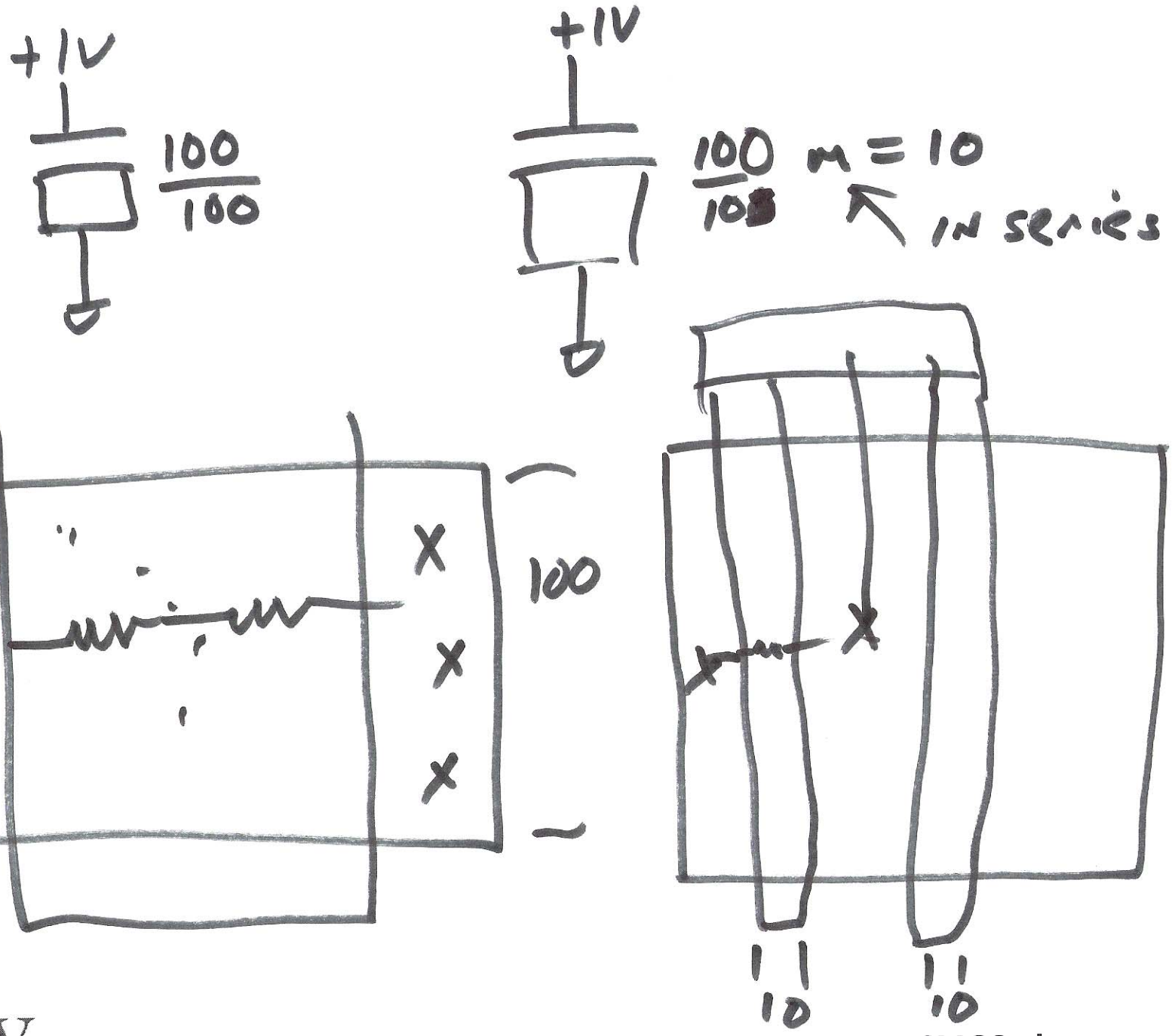


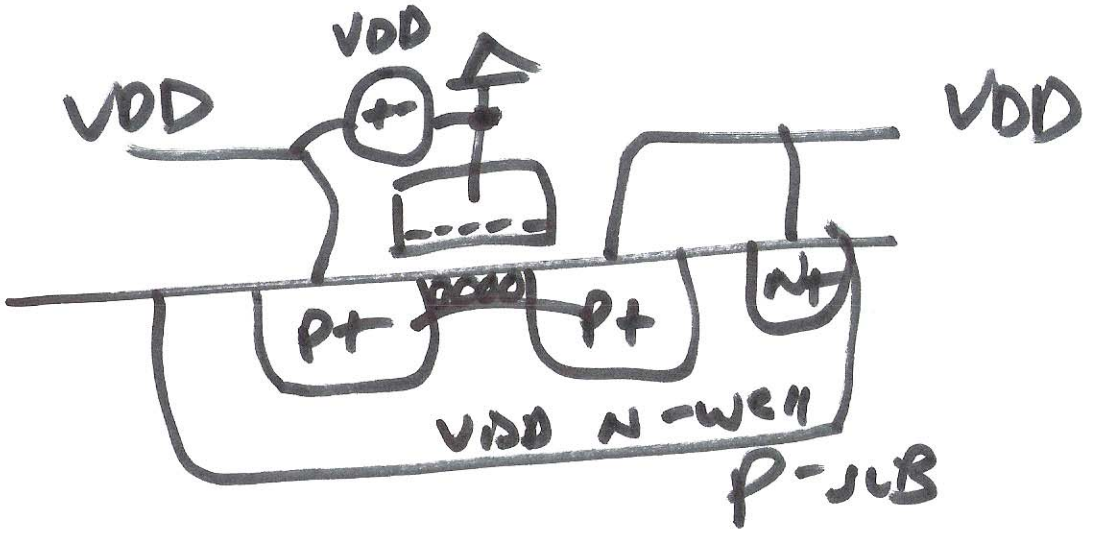


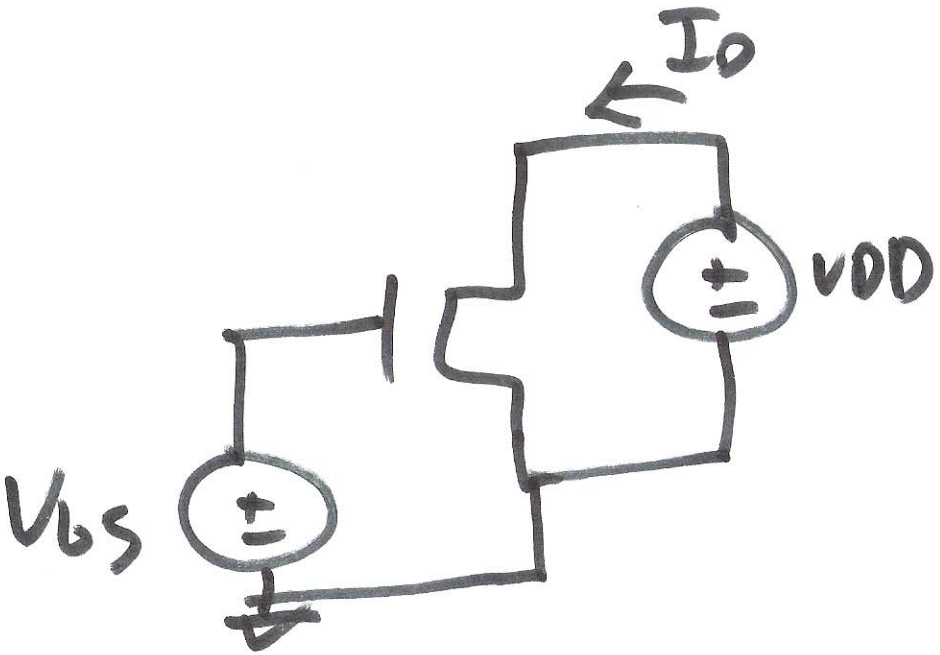


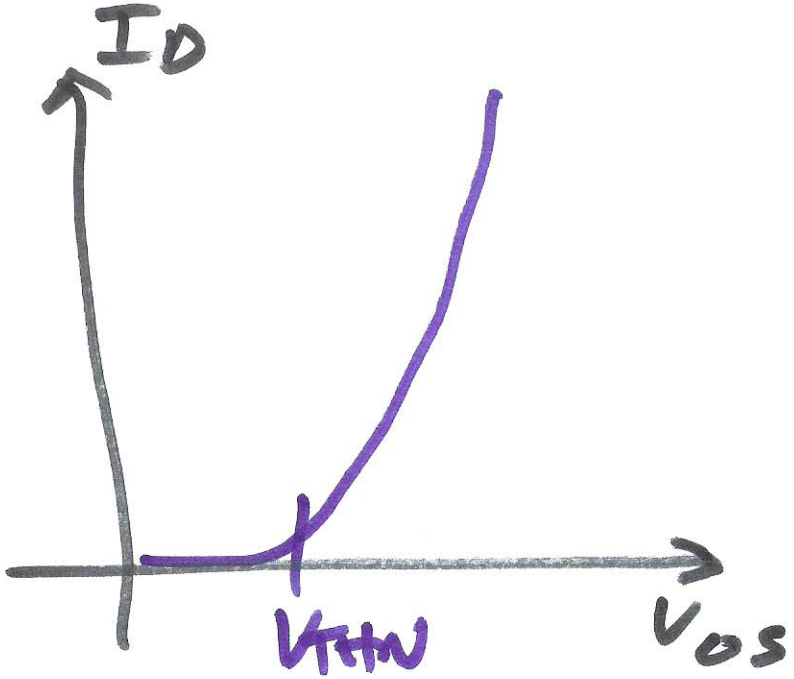
Good CAP











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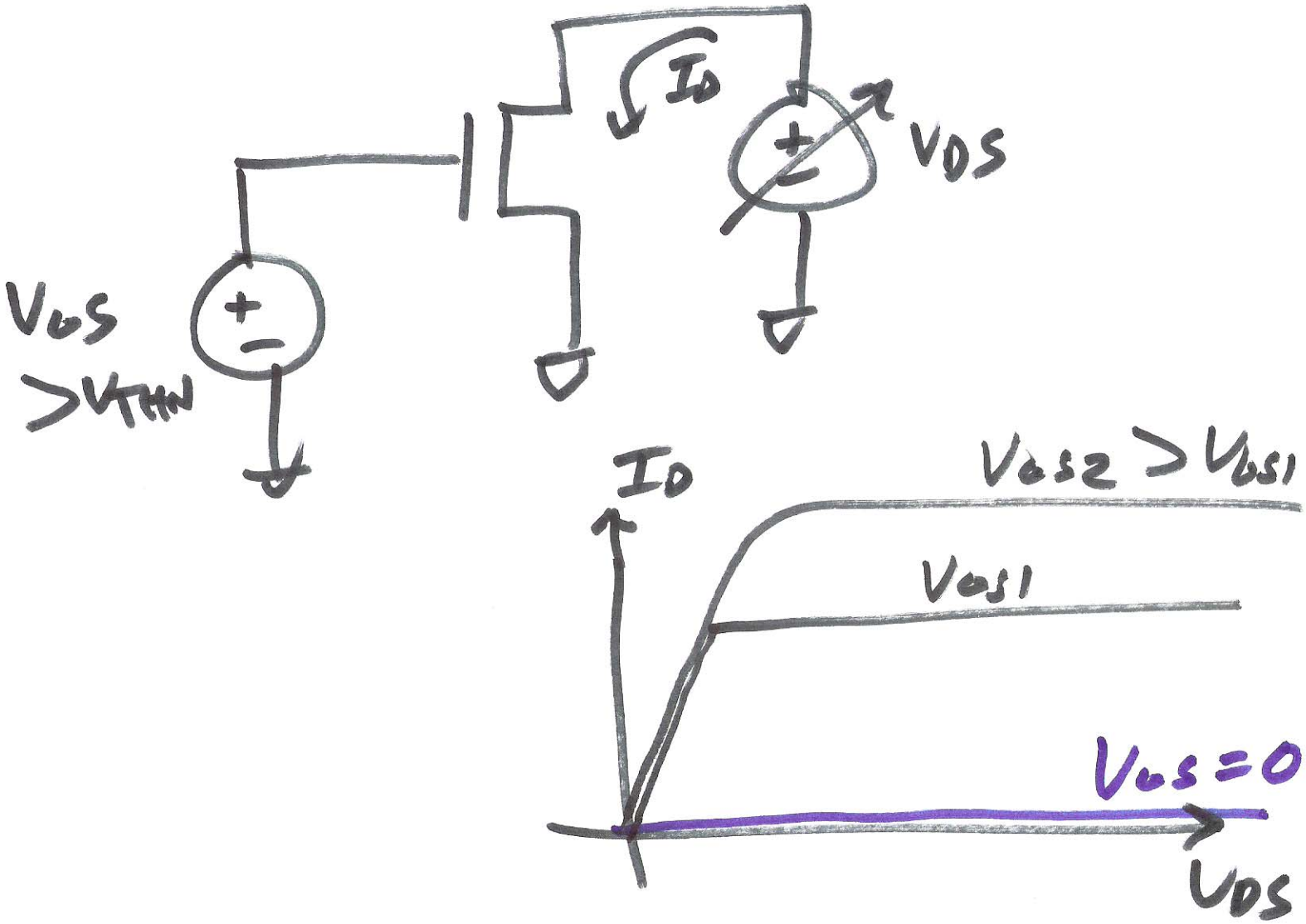

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