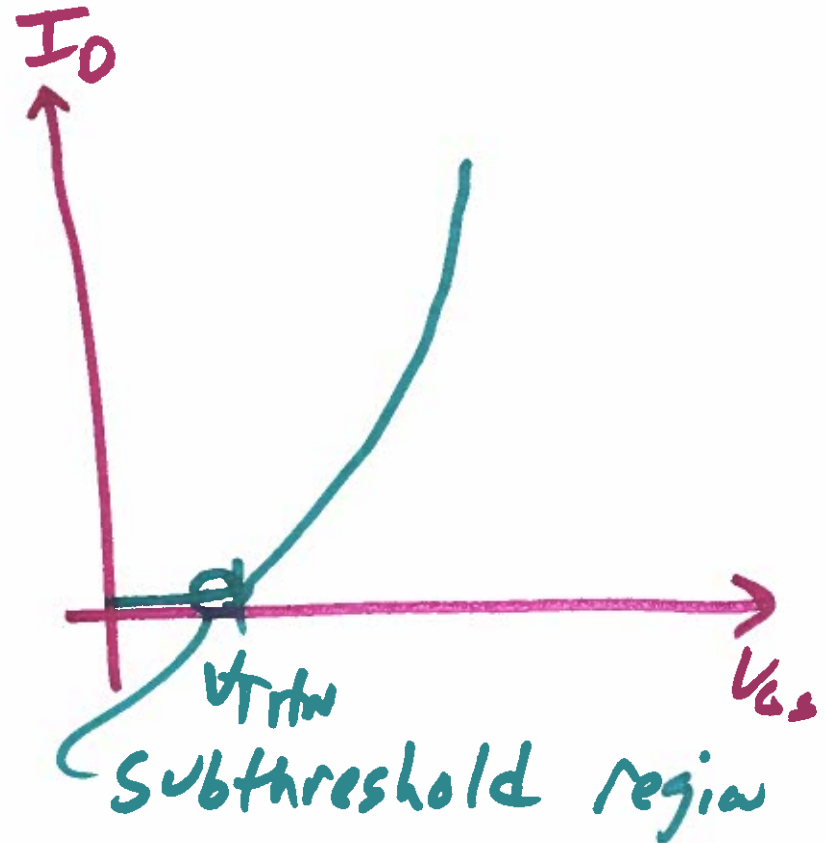
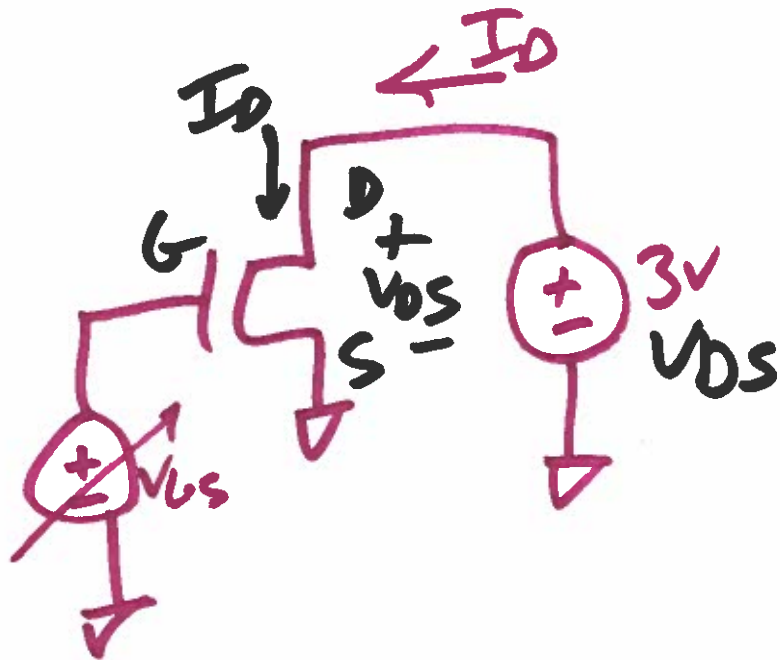


EE 421 / ECG 621

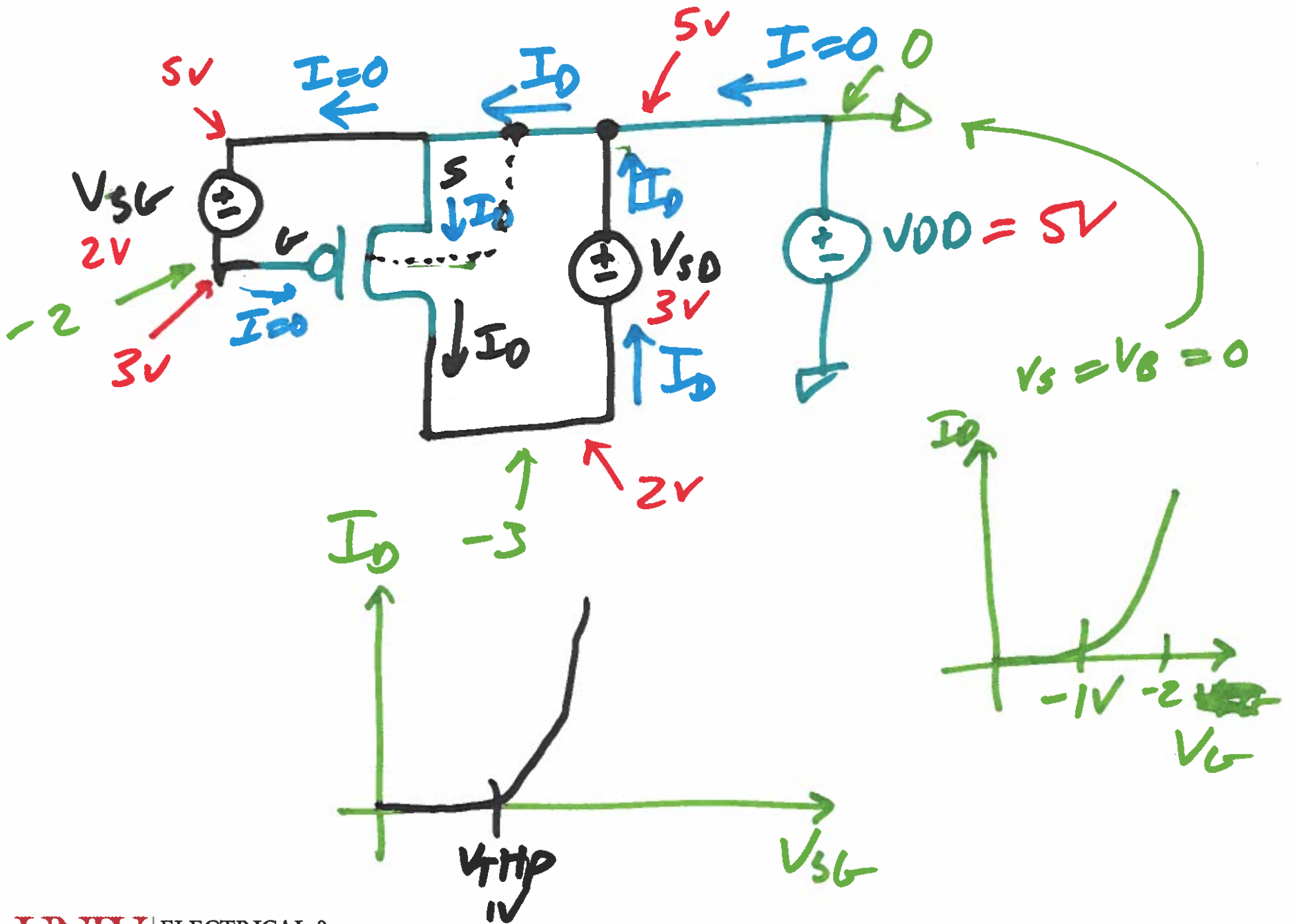
Digital IC Design

OCT. 2, 2019

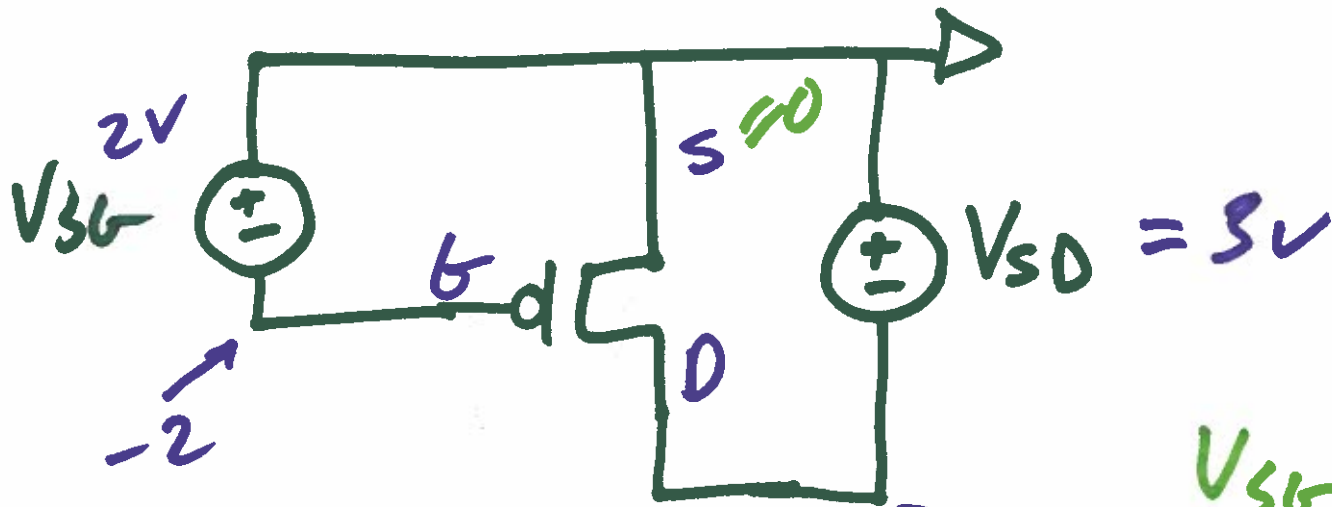
Lecture 11



1)



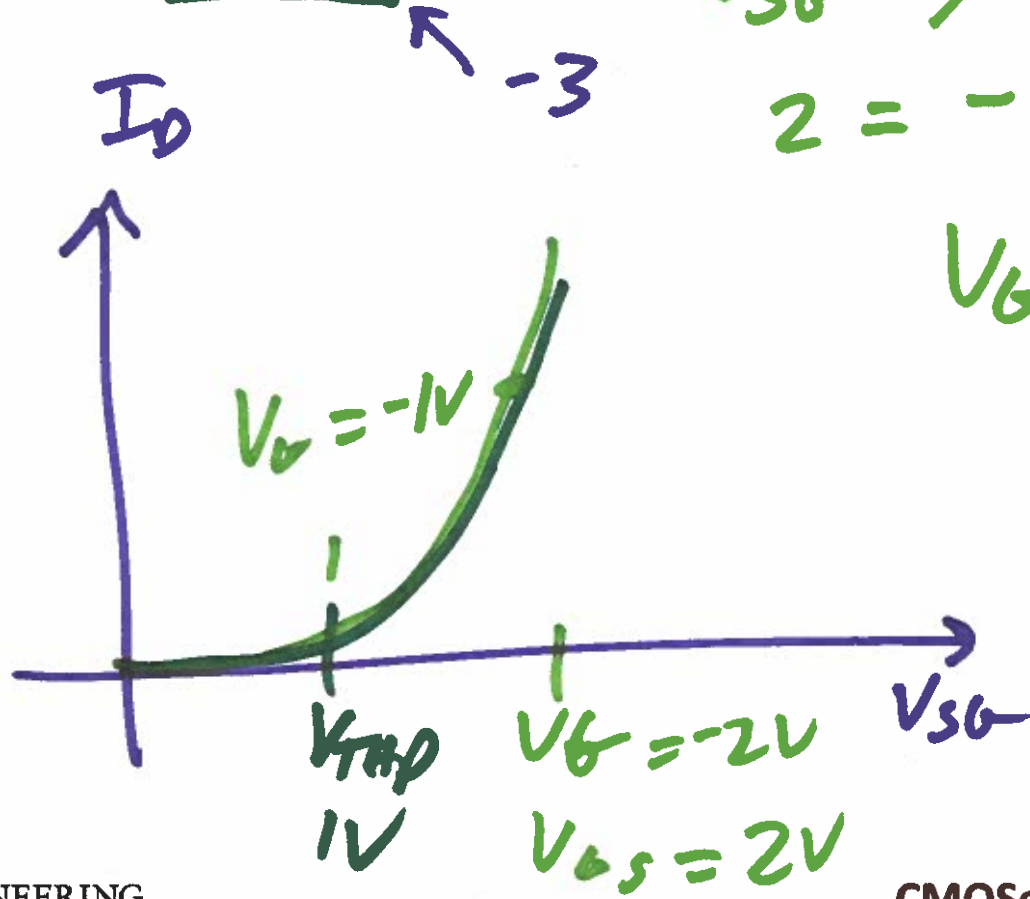
2)



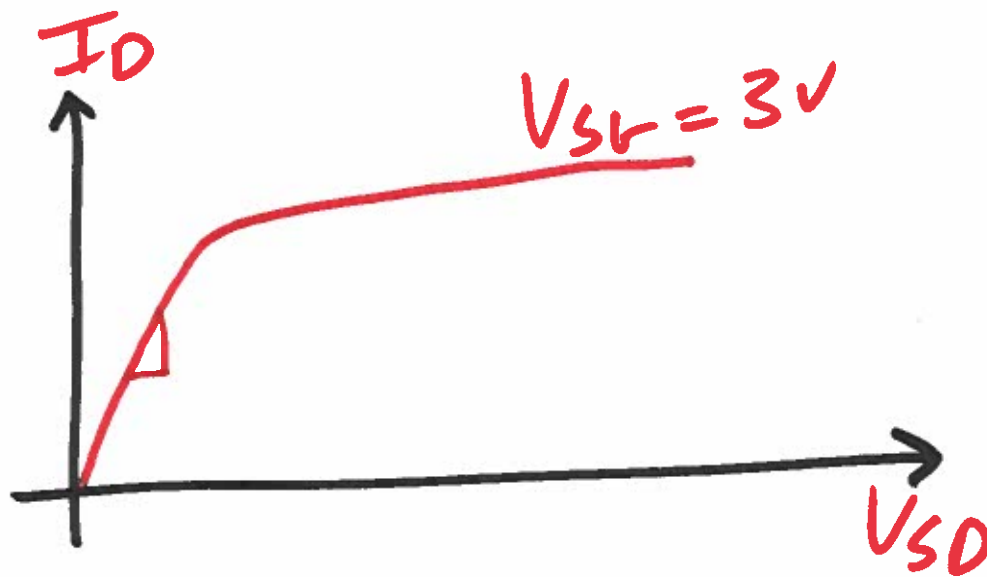
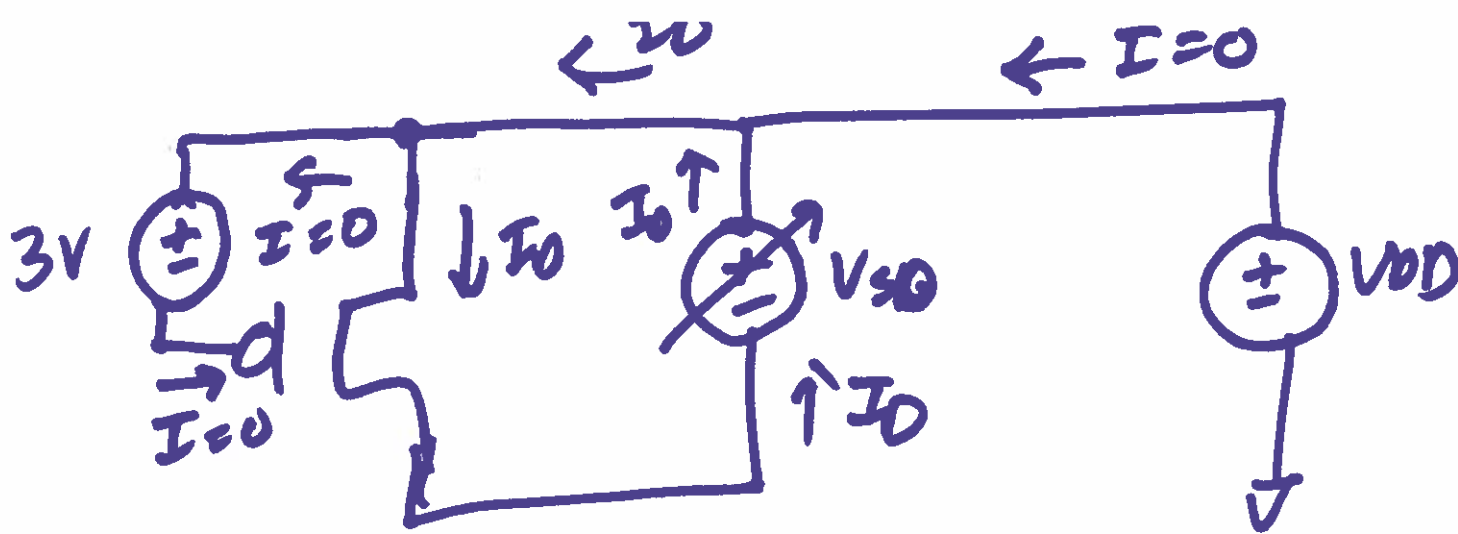
$$V_{SG} = V_S - V_G$$

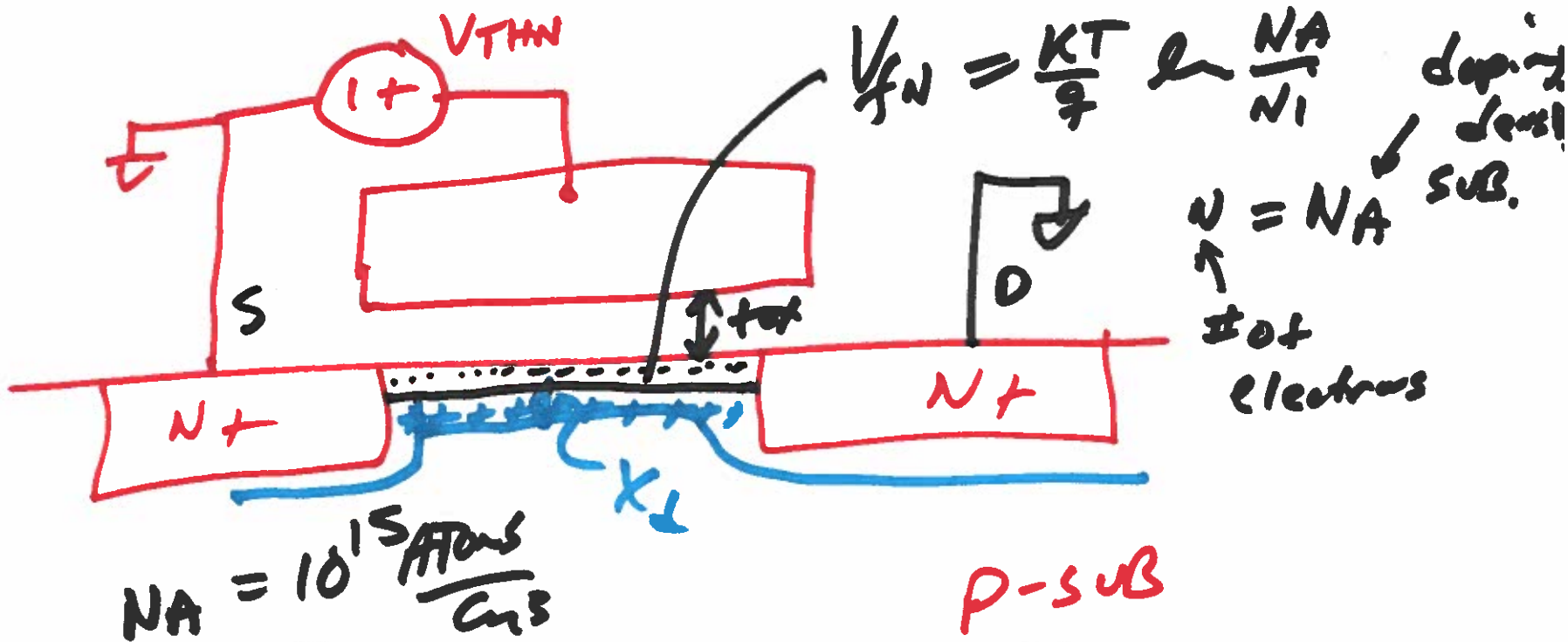
$$2 = -(-3 - 2)$$

$$V_G = -2$$



3)

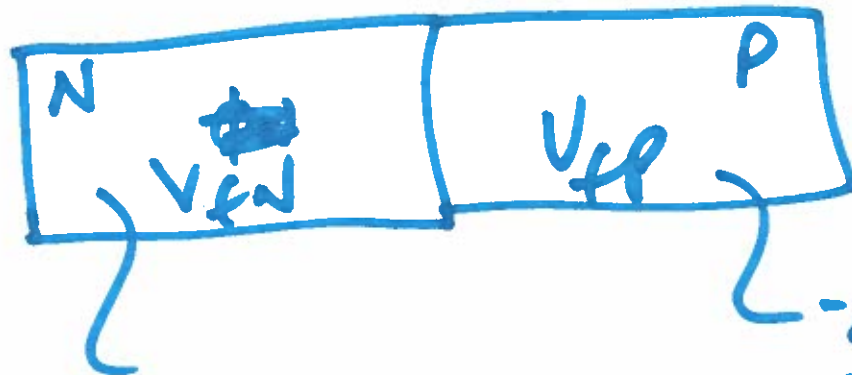




$V_{fp} = -\frac{KT}{q} \ln \frac{N_A}{N_i} = \phi_s$ with applied potential

$\phi_s \rightarrow -\frac{KT}{q} \ln \frac{N_A}{N_i}$
 \downarrow
 $+\frac{KT}{q} \ln \frac{N_A}{N_i}$
 $Dqs = 2V_{fp}$

5)



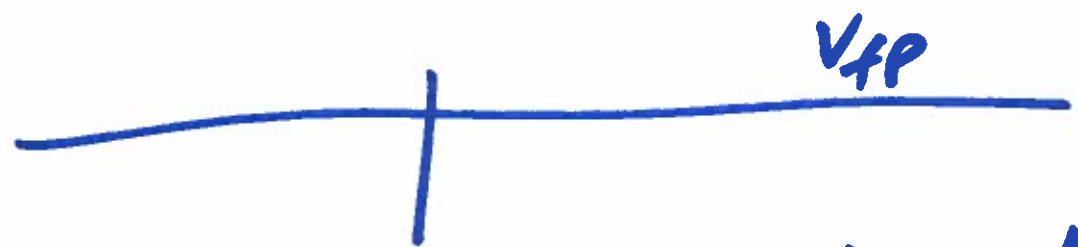
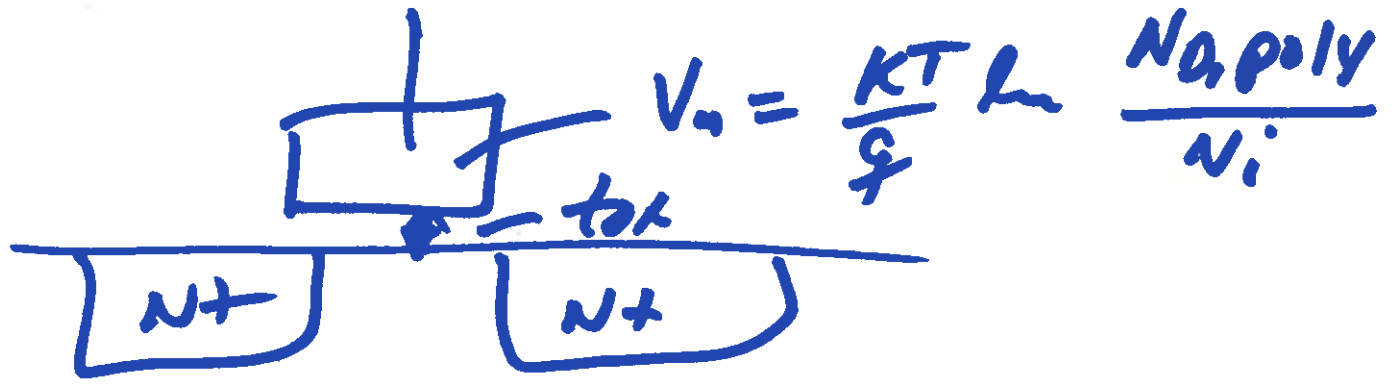
$$\phi = \frac{KT}{q} \ln \frac{N_0}{N_i}$$

$$-\frac{KT}{q} \ln \frac{N_A}{N_i} = \frac{KT}{q} \ln \frac{N_i}{N_A}$$

$$V_{FN} - V_{FP} = \frac{KT}{q} \ln \frac{N_A N_0}{N_i^2}$$

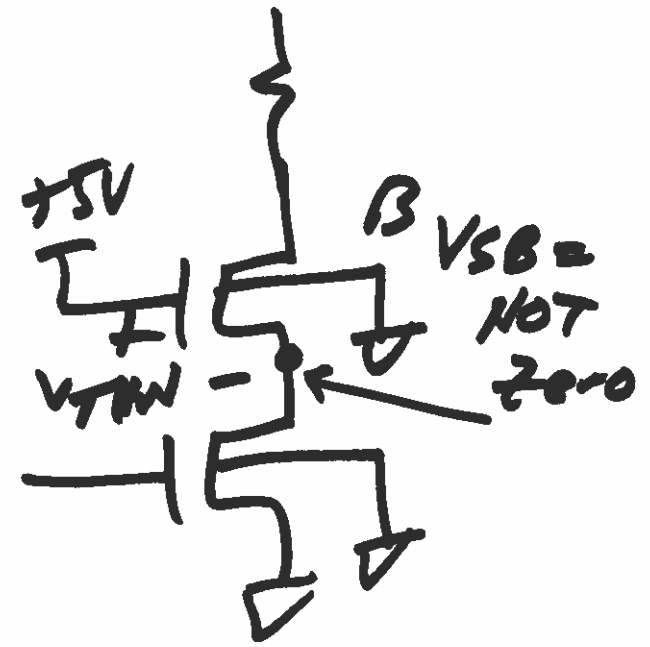
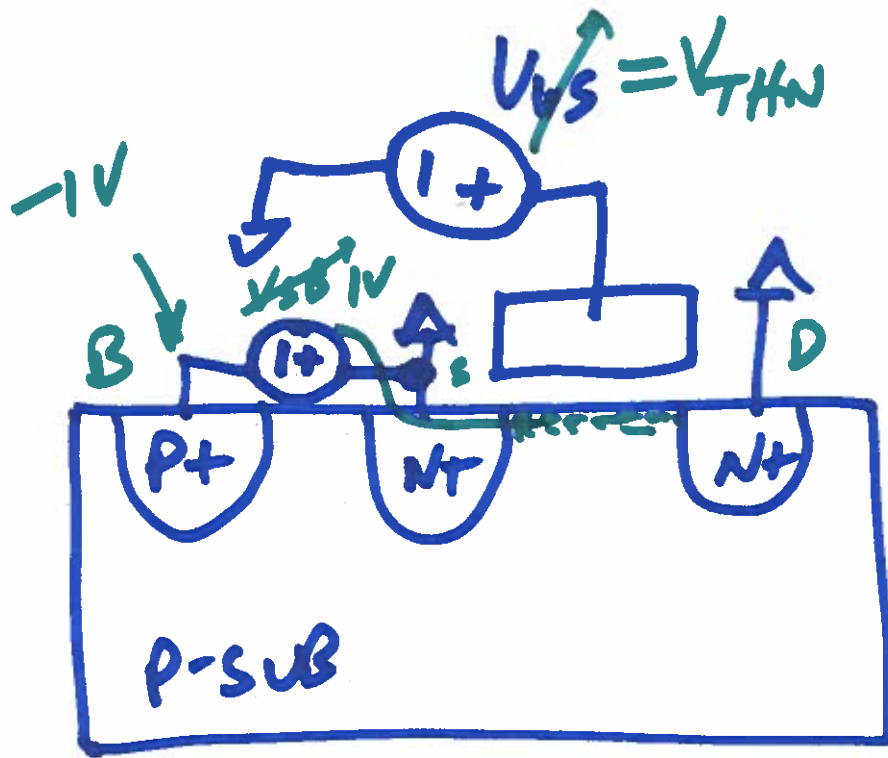


$$V_{f1} - V_{f2} + V_{f2} - V_{f3} + V_{f3} - V_{f4} = V_{f1} - V_{f4}$$



$$V_{ms} = \frac{kT}{q} \ln \frac{N_{A,poly}}{n_i} - \frac{kT}{q} \ln \frac{N_A}{n_i}$$

7)



Body effect



8)