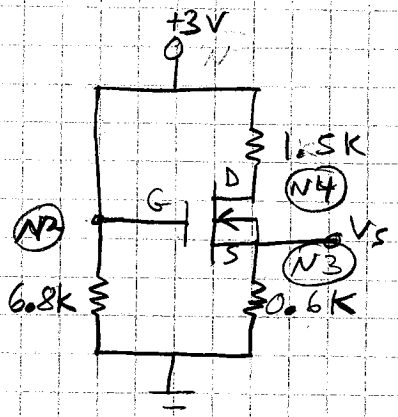

$K'_n = 1.825 mA/V^2$

$\frac{W}{L} = 1$

$V_{tn} = 1V$

LAB6

$V_G = 3V$

$V_{GS} = 3V - V_S \qquad V_{DS} = 3 - \left(\frac{V_S}{600}\right)(1.5k)$

$I_{DS} = \frac{V_S}{0.6K}$

(SAT) $I_{DS} = \frac{K'_n}{2}\left(\frac{W}{L}\right)\left[(3-V_S)-1\right]^2$

$V_S = (0.794, 5.03)$

$V_S \neq 5.03 > V_G$ (for sat) $\Rightarrow V_S = 0.795$

$V_{GS} = 3 - 0.795 = 2.205$

$I_{DS} = \frac{0.795}{600} = 1.325 mA$

$V_D = 3 - (1.325mA)(1.5k) = 1.01V$

$V_{DS} = 1.01 - 0.795 = 0.217 < V_{GS} - V_T$ (sat fails)

(LIN) $I_{DS} = K'_n\left(\frac{W}{L}\right)\left\{\left[(3-V_S)-1\right]\left[3-\underbrace{\left(\frac{V_S}{600}\right)(1.5k)}_{\rightarrow -V_S}\right] - \frac{\left[3-\left(\frac{V_S}{600}\right)(1.5k)\right]^2}{2}\right.$

$V_S = (-0.838, 0.6813)$

$V_S \neq -0.838 < 0 \Rightarrow V_S = 0.6813$

$V_{GS} = 3 - 0.6813 = 2.3187$

$I_{DS} = \frac{0.6813}{600} = 1.136 mA$

$V_D = 3 - (1.136mA)(1.5k) = 1.297V$

$V_{DS} = 0.615V$

$V_{DS} < V_{GS} - V_{tn} = 1.3187$

$\therefore$ Linear operation is verified

Measured: $R_S = 599.749\Omega$

$R_D = 1488\Omega$

$I_{DS} = 1.106 mA$

$V_{DS} = 0.682V$

$V_{GS} = 2.33V$

$V_S = 0.663V$

$V_D = 1.347V$