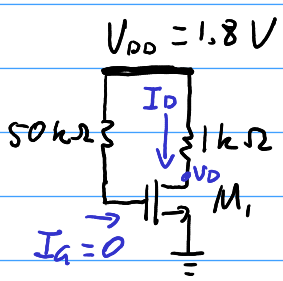
7.1



Given $\mu_n C_{ox} = 200\ \frac{\mu A}{V^2}$, $\lambda = 0$, $V_{TH} = 0.4\ V$.
Find maximum $\frac{W}{L}$ for M_1 to remain in saturation.

Notice $I_G = 0 \therefore V_{GS} = 1.8\ V$.

$I_D = \frac{1}{2}\mu_n C_{ox}\frac{W}{L}(V_{GS} - V_{TH})^2$ in saturation. (1)

The edge of saturation is when V_{DS} falls below V_{GS} by more than one threshold.

$V_{D,min} = V_{GS} - V_{TH} = 1.8 - 0.4 = 1.4\ V$.

By Ohm's law, $V_D = V_{DD} - 1000 I_D$

$1.4 = 1.8 - 1000 I_D$

$I_D = 0.4\ mA$.

$\therefore$ From (1)

$0.4 \times 10^{-3} = \frac{1}{2} \times 200 \times 10^{-6} \times \frac{W}{L}(1.8 - 0.4)^2$

$\Rightarrow \frac{W}{L} = 2.04$.