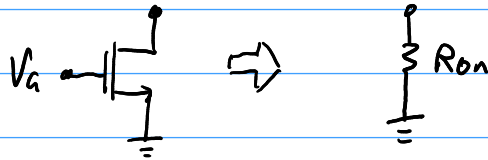


6.11

Given $\mu_n C_{ox} = 200 \mu A/V^2$, $V_{TH} = 0.4 V$.

An NMOS device is used as a resistor.

What is the minimum R_{on} given $\frac{W}{L} = 20$.



Since the supply voltage is $1.8 V$, we could choose V_{gs} in the range $0 \leq V_{gs} \leq 1.8 V$.

However, when using the MOSFET as a variable resistor, only the range $V_{TH} < V_{gs} \leq 1.8 V$ would be useful.

$$R_{on} = \frac{1}{\mu_n C_{ox} \frac{W}{L} (V_{gs} - V_{TH})}$$

Minimum $R_{on} \Rightarrow$ Maximum V_{gs} .

\therefore Choose $V_g = V_{gs} = 1.8 V$.

$$\therefore R_{on} = \frac{1}{200 \times 10^{-6} \times 20 \times (1.8 - 0.4)} = 179 \Omega.$$