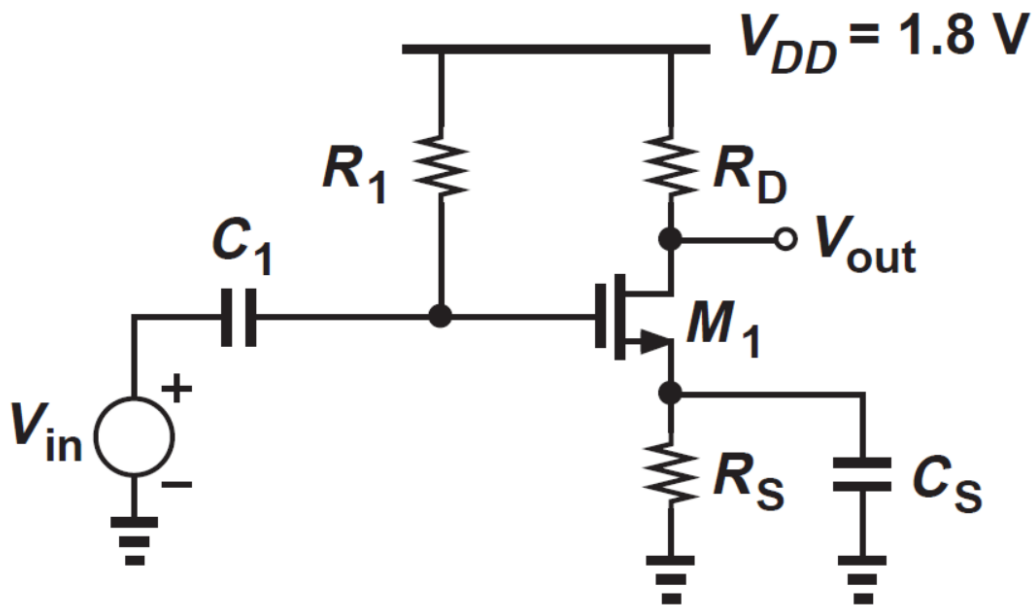
Q1. The circuit below has a voltage gain of 6. Assuming a power budget ($V_{DD} \times I_D$) of 2 mW and an input impedance of 20 kΩ, find $R_D$ and a range of $R_S$ in the circuit such that $M_1$ operates 200 mV away from the triode region. $V_{TH}$ = 0.4 V and no gate leakage. $A_v = \frac{g_m R_D}{1+g_m R_S}$.



Q2. Due to a manufacturing error, a parasitic resistor $R_P$ has appeared in the circuit below. We know that circuit samples free from this error exhibit $V_{GS} = V_{DS} + 100$ mV whereas defective samples exhibit $V_{GS} = V_{DS} + 50$ mV. Determine the value of W/L and $R_P$. $\mu_n c_{ox} = 200\mu$; $V_{TH} = 0.4$ V. *Hint*: find W/L from the MOSFET without defect first.