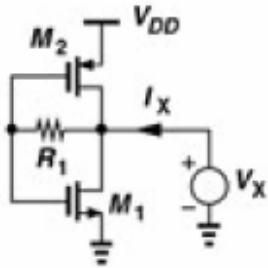
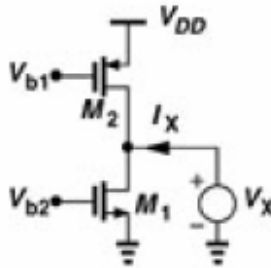


EECE488 Analog CMOS Integrated Circuit Design
Assignment 2
Due: Tuesday February 9th, 2010 at 9:30am

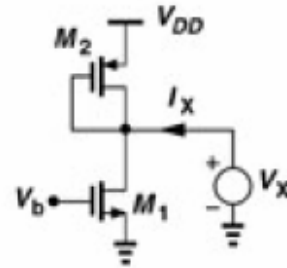
1. a) Use HSPICE and 0.35 μm CMOS technology library to plot the I_D - V_{DS} characteristic of an NMOS transistor with $W=10\mu\text{m}$ and $L=0.35\mu\text{m}$ for $V_{GS}=0.5, 1, 1.5, 2,$ and 2.5V .
 - b) Assuming that long channel quadratic equations for I_D holds, estimate the process parameters V_{th} , $\mu_n C_{ox}$, and λ for the transistor of part (a) using the I_D - V_{DS} plots or any other additional plot that you think may be useful.
 - c) Calculate g_m of the transistor in part (a) for each value of V_{GS} based on your estimated values in part b and long channel equations discussed in class. Compare the estimated g_m values with those calculated by HSPICE (using g_{mo} parameter) and calculate the relative error.
2. Calculate the output resistance (V_X/I_X) of the following circuits. Assume $\lambda \neq 0$ and $\gamma = 0$.



(d)

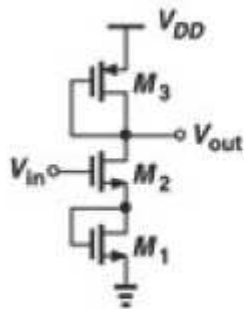


(e)

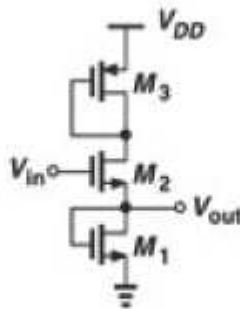


(f)

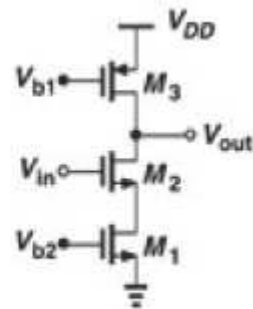
3. Calculate the small-signal voltage gain of the following circuits. Assume $\lambda \neq 0$ and $\gamma = 0$.



(b)



(c)



(d)

Good luck