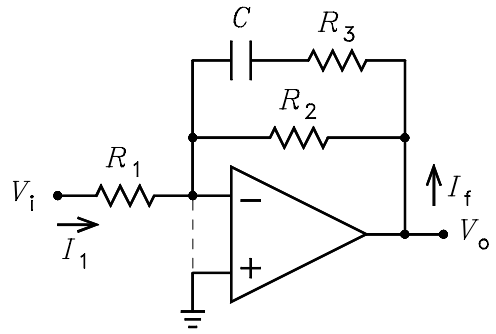
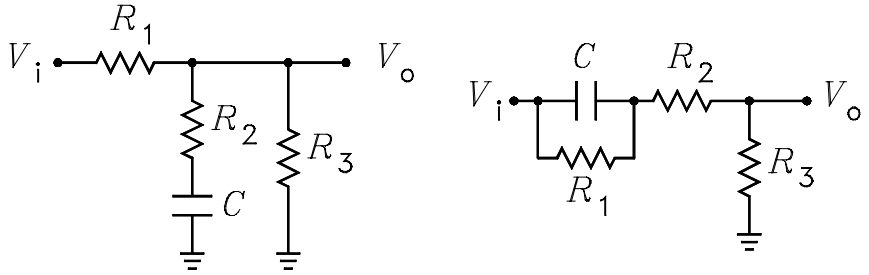
EE3050 Fall 2000
Some Practice Problems

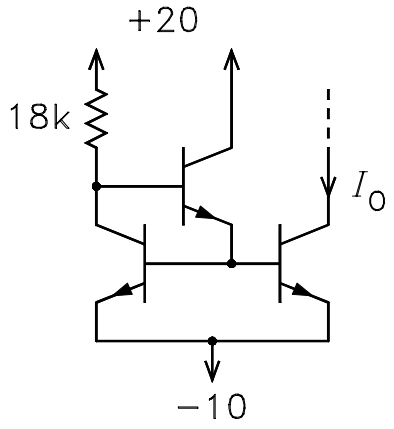
1. Solve for V_o/V_i by setting $I_1 + I_f = 0$. Hint, use the inspection method for Z_F. Sketch and label the Bode magnitude and phase plots.



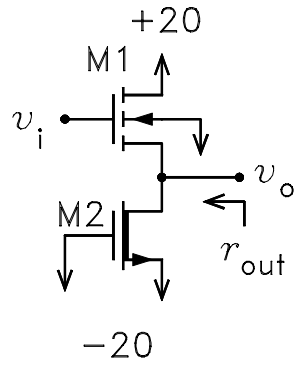
2. Solve for V_o/V_i. Sketch and label the Bode magnitude and phase plots.



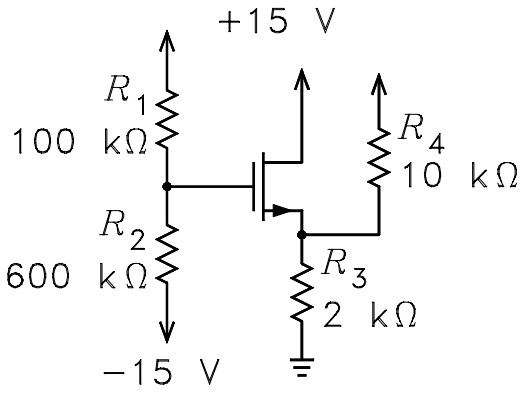
3. (a) It is given that $V_{BE} = 0.65$ V, $V_A = \infty$, and $\beta = 49$. Solve for I_O. (b) If $V_A = 50$ V, solve for r_{out} using the value of I_O found in part (a).



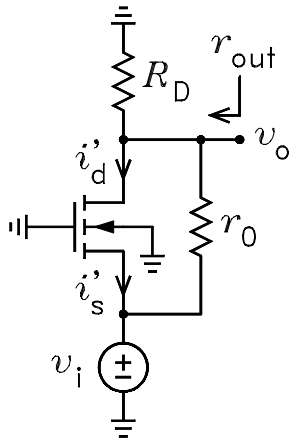
4. (a) For M1, it is given that $K = 0.001$ A/V^2 and $V_{TO} = -1.25$ V. Solve for the dc drain current. (b) For M2, it is given that $K = 0.001$ A/V^2, $V_{TO} = +1.25$ V, and $\chi = 0.35$. Calculate V_{GS1}, g_{m1}, r_{s1}, and r_{is1}. (c) If $r_{01} = r_{02}$, calculate v_o/v_i and r_{out}. (d) Repeat part (c) if the body of M1 is connected to its source.



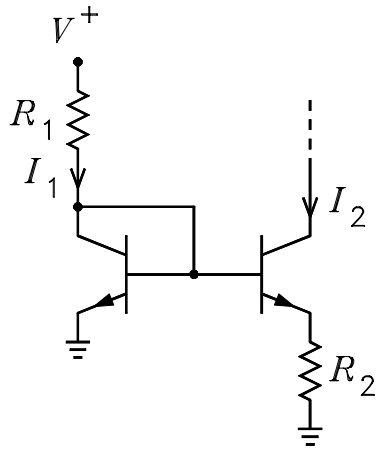
5. For the MOSFET, it is given that $K = 0.001$ A/V^2 and $V_{TO} = 1.5$ V. Solve for I_D.



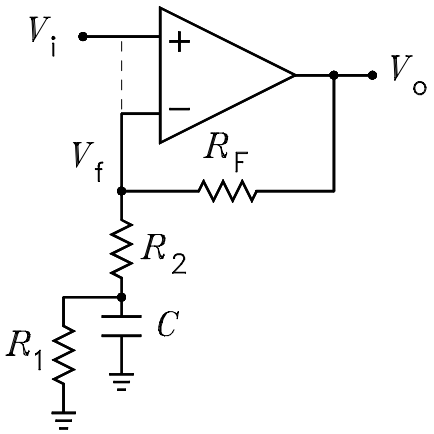
6. It is given that $I_D = 2$ mA, $K = 0.00075$, $V_{TO} = 2$ V, $V_{DS} = 10$ V, $\lambda = 0.02$, $\chi = 0.4$, and $R_D = 10$ kΩ. The r_0 in the figure is shown as an external resistor here. Solve for v_o/v_i, r_{out}, and the input resistance seen by v_i.



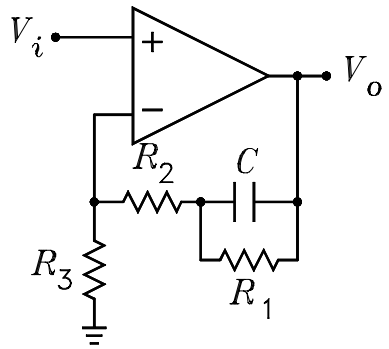
7. If $I_S = 5 \times 10^{-15}$ A, $\beta = \infty$, and $V^+ = 24$ V, solve for R_1 and R_2 such that $I_1 = 2$ mA and $I_2 = 0.1$ mA.



8. Solve for V_o/V_i. Sketch and label the Bode magnitude and phase plots.



9. Solve for V_o/V_i. Sketch and label the Bode magnitude and phase plots.



10. For each MOSFET, it is given that $g_m = 1/200$, $r_0 = 30$ kΩ, and $\chi = 0.3$. The element values are $R_{G1} = 100$ kΩ, $R_{D1} = 10$ kΩ, $R_{S1} = 100$ Ω, and $R_{G2} = 5$ kΩ. Solve for v_o/v_i and r_{out}.