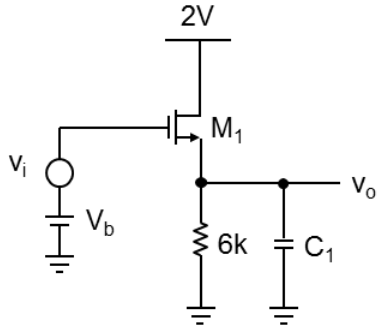
Electronic Circuits & Systems (ECE102) - ECE MS Comp Exam, Fall 2013

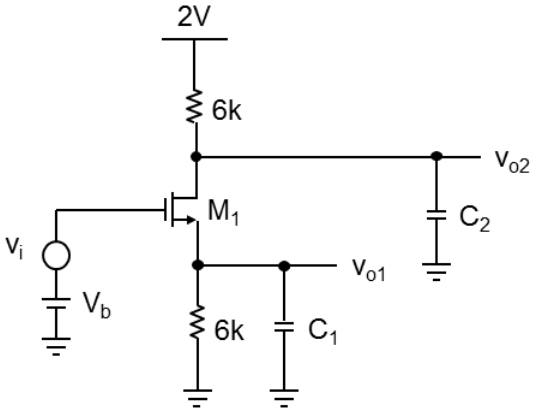
Problem #1:



Answer with the following parameters: $\mu C_{ox} = 200\mu A/V^2$, $V_{th} = 0.4V$, $C_{ox} = 40fF/\mu^2$, and $W/L = 80\mu/0.2\mu$.

1. Set the input DC bias V_b so that the output DC can be 0.6V?
2. In this bias condition, estimate the low-frequency small-signal gain v_o/v_i.
3. Calculate the pole and zero frequencies if C_1 is the same as C_{gs}.
4. What is the maximum peak-to-peak output swing you can get?
5. Now if C_1 is 1pF, sketch the Bode gain and phase plots.

Problem #2:



Now add a 6k resistor to the drain of the same amplifier given in #1. Assume the same bias condition stays the same.

1. What is the DC voltage at the drain?
2. Explain why the low-frequency small-signal gain v_{o1}/v_i is the same as derived in #1.
3. Estimate the low-frequency small-signal gain v_{o2}/v_i.
4. If C_1=0 and C_2=1pF, what is the -3dB bandwidth of this gain?
5. If C_1=C_2=1pF, explain what happens.