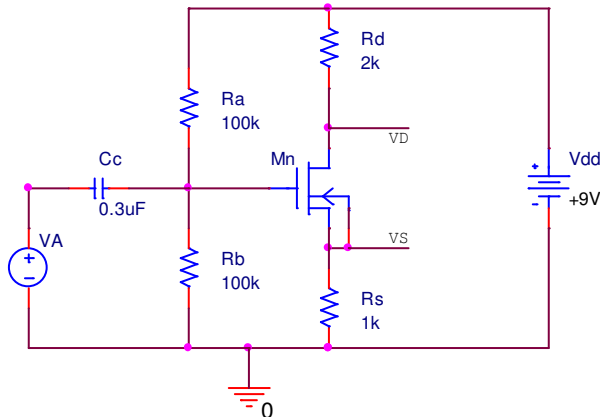303 Fall 2008 – Homework 4 Due 09/30/08

For these problems the transistors should again be those of the 4007 package.

1. The following circuit is Figure 1 of Lab 6 where it is assumed that Cc is large enough to be considered infinite.



a) Find the Q point and with it the gm and go of Mn. Ignoring all parasitic capacitors, draw the small signal equivalent circuit and  find the small signal gains vd/va and vs/va.
b) Place a 0.3uFd capacitor, Cs, in parallel with Rs and assume that it is the only effective capacitor in the circuit. Find the resulting small signal gains (as functions of complex frequency s) and give their poles and zeros, comparing those in vd/va with those of vs/va.

2. In the above circuit replace the NMOS transistor by a PMOS, Mp, (with its bulk connected to its source) and interchange the resistors Rs and Rd (so they will still be tied to the source and drain); also relabel so that VD is at the drain and VS at the source).
a) Draw the new schematic.
b) Repeat Problem 1a) above for the new schematic. Compare with the results of Problem 1a).
c) Repeat Problem 1b) above for the new schematic (placing Cs again across the source resistor Rs).