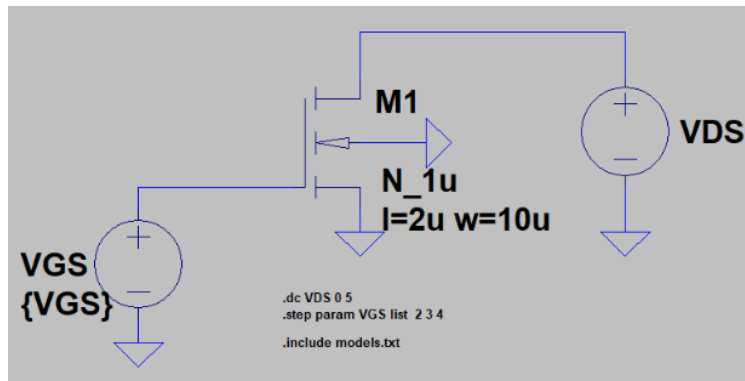


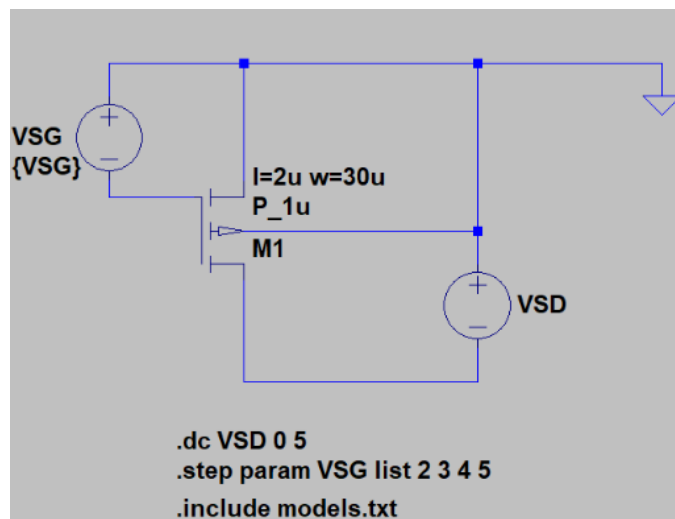
E338 Homework 4 MOSFETs

**KP and Vth can be found in model.txt

1. (1) Build the circuit using nmos in LTSpice, and change the VGS values to 'list 1.5 1.8 2', and simulate the 'VDS vs ID' curve. (2) Use a fixed VGS voltage and change the variable to VDS, and use '.step param VDS list 2 3 4 5', and simulate the 'VGS vs ID' curve. Show your simulation on a printed paper for credit.



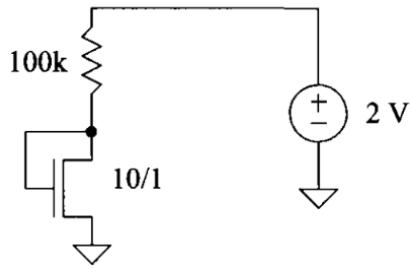
2. Repeat the problem above for the PMOS circuit below: (please note that it is VSG/VSD now, and the PMOS substrate is connected to the highest potential in the circuit). Show your simulation on a printed paper for credit.



3. Draw a figure to explain the 'Body Effect'.

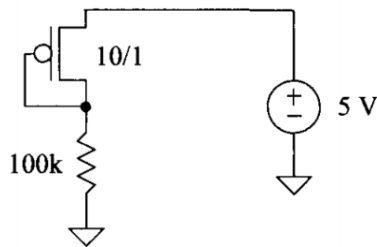
4. Calculate I_D of the NMOS and verify with LTSpice. Show your calculation/simulation on a printed paper for credit.

**KP and Vth can be found in model.txt. Use the N_1u model for this problem.



5. Calculate I_D of the PMOS and verify with LTSpice. Show your calculation/simulation on a printed paper for credit.

**KP and Vth can be found in model.txt. Use the P_1u for this problem.



6. For the circuits seen in the following figures, estimate the output DC voltage. Verify the calculation using LTSpice. (use .op)

. **KP and Vth can be found in model.txt. Use the N_1u and the P_1u for this problem.

