File: c:\temp\courses\spring2004\302\hmwrk1.doc RWN 02/05/04

ENEE 302 Homework Set 1 Due Th 02/12/04

for all these problems use the mnmosis and mpmosis transistors

#1. 25 points

a) Using Spice plot on the same scale curves of ID for both NMOS and PMOS transistors. Choose all widths and lengths to be 10u and bulks tied to sources.

b) Using the P channel width, Wp, as a parameter find by using Spice plots the width which best has the PMOS the complement of the NMOS (that is, such that they both have similar magnitudes of ID for the same magnitudes of VGS and VDS). Plot on the same graph using |VDS| but actual ID.

c) Calculate from the plots in a) KP and VTO and compare with the model parameters.

#2. 25 points

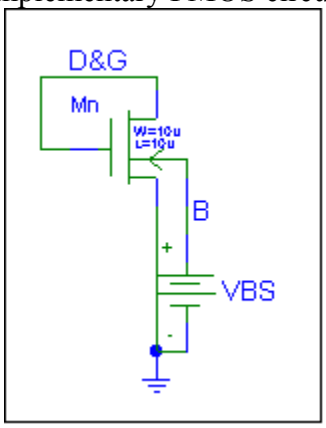
Plot IC versus VCE with IB as a parameter for the BN2x4 BJTs.

#3. 25 points

a) For the following NMOS circuit plot the bulk current IB as a function of the bulk to source voltage for W=L=10u.

b) Do the same as a parametric run with $10u \leq W \leq 50u$ in 10u steps.

b) Repeat for a complementary PMOS circuit.



#4. 25 points

For the following circuit use R1 as a parameter and in Spice determine its value for Vout=Vdd/2; check analytically.