

ENEE 302 Homework Set 1 Due Tu 02/08/05

for all these problems use the mnmosis and mpmosis transistors which are in the bimos12.lib and bimos12.slb (for PSpice versions 8 or less) and bimos12.olb (for Cadence versions of PSpice) available at <http://www.ee.umd.edu/newcomb/bicmosis.htm>

#1. 25 points

a) Using Spice plot on the same scale curves of I_D for both NMOS and PMOS transistors. Choose all widths to be 30u and lengths to be 10u and bulks tied to sources.

b) Using the N channel width, W_n , 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 I_D for the same magnitudes of V_{GS} and V_{DS}). Plot on the same graph using $|V_{DS}|$ but actual I_D .

c) Calculate from the plots in a) K_P and V_{TO} and compare with the model parameters.

#2. 25 points

For the BN2x4 npn BJT in the bimos12.lib

a) Plot I_C versus V_{CE} with I_B as a parameter.

b) Plot diode curves, and compare the results, when the transistor is connected in two different ways:

b1) with collector tied to base

b2) with emitter tied to base

#3. 25 points

For the following circuit use R1 as a parameter and in Spice determine its value for $V_{out} = V_{dd}/3$; check analytically.

