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303 Spring 2012– Homework 1 Due 02/06/12 in class

For the following it will be helpful if you change the Probe background from black to white so that the curves can be well distinguished (this is probably already set as default by the ECE Helpdesk).

1. (20 points, CMOS curves) Run curves for the CMOS 4007 to reproduce those on the course web page under the title "4007 NMOS and PMOS curves." Devise a means to plot the PMOS curves as ID versus VDS (rather than VSD).
   For this problem use breakout transistors and copy the 4007 models. You can follow the instructions on the course web page under "technique for customizing breakout device models" [which is for PSpice version 8 so there will be slight differences for later PSpice versions] and with the models given in "library file for breakout 4007 transistors."
   Submit these curves for 0≤VDS≤5 in 0.1V steps nested with 0≤VGS≤5 in 1 V steps for NMOS (and the negatives for PMOS).

2. (30 points, A&D inverters) The UA741 op-amp is in the opamp.olb library and the AM12L3 transistors are in the bicmos12.olb library (path to them: ..:\Cadence\SPB_16.01\tools\pspice\library\ ). Use them in the following circuit. You will need to configure the bicmos12.lib in the Pspice Simulation Profile under Configuration Files, library (and add to Design)
   a) Do a DC run on the input voltage over -9<Vin<9 and plot the output voltages V(outA) and V(outD). Change the curve colors to black (right click and use properties; the background should be set at Bright White as default).
   b) Explain the differences in the two curves as well as the zero crossings.
   c) Print out the uA741 PSpice op-amp model and compare with the actual transistor circuit given in Fig. 12.13 of the text. (Fig. 9.13 of 5th edition).