Homework Assignment No. 4

Due on Wednesday, February 9, 2005

1.) Problem P4.2 of the text. (This problem should refer to Fig. P4.1 not Fig. P4.2)

[Partial Answers: a.) $V_{OH} = V_{DD}$ and V_{OL} =0.055V b.) V_{OH} = 0.733V, andV_{OL} ≈0.69V, c.) V_{OH} =1.11V and V_{OL} =0.69V]

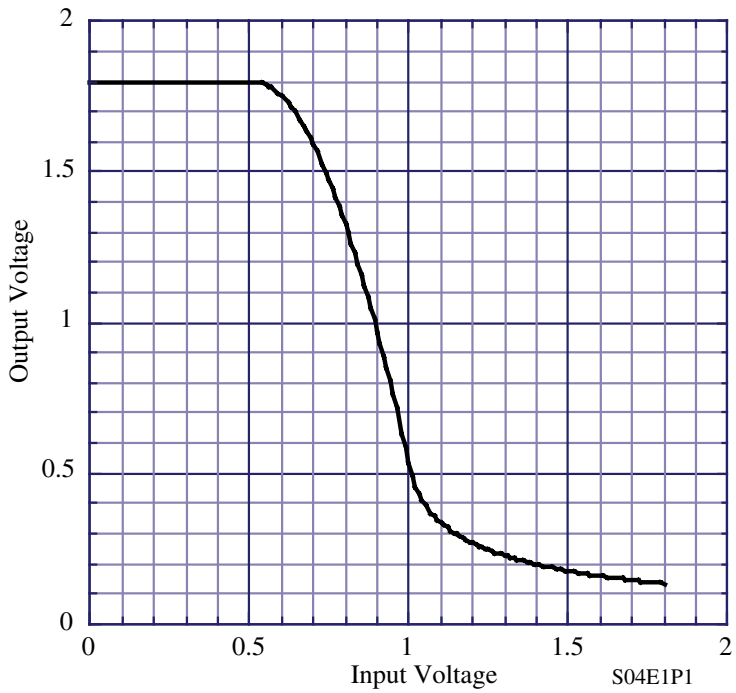
2.) Problem P4.3 of the text. Use SPICE to confirm the results.

[Partial Answers: V_{IH} = 0.65V and V_{IL} = 0.55V]

3.) Problem P4.9 of the text.

[Answers: W_n = 0.2μm, 0.1μm and 0.6μm]

4.) From the voltage transfer function curve shown, numerically identify, V_{OH}, V_{OL}, V_{IL}, V_{IH}, and V_S. From these values, find the value of NM_H and NM_L.



5.) Given the layout for the NMOS transistor of Problem 2, find the value of C_{gs}, C_{gd}, C_{gb}, C_{db}, and C_{sb} assuming that the junction depth of the source-drain diffusions is x_j = 50 nm, m = 0.5 and the lateral diffusion is 10nm.