File: c:\temp\courses*fall2004*\610\hmwrk2.doc RWN 09/15-19/04

ENEE 610
Homework Problems for Grading, Set 2 (60 points)
Due at class M 09/27/04
Linear and nonlinear v(i)

1.(20 points)

For the MOS circuit discussed in class with DC equations set up on 09/13/04 choose branches ~~1,2,~~3,4, **5,6** (with the same orientation as in class) for the tree.

a) Draw the new graph highlighting the new tree and from it obtain the new cut-set and tie-set matrices.

b) For this tree give the branch by branch admittance and from it the input admittance, i/v.

c) Insert gate-source and gate-drain capacitance and replace the capacitor C (between the two transistor sources) by an inductor L. For the resulting circuit find the natural frequencies.

2. (20) points

For the same circuit as in problem 1 above, place a capacitor Cd between the two transistor drains. In the presence of the gate-source and gate-drain capacitors, find the new driving point impedance z(s)=v/i. Give impulse responses under the condition that all capacitances and R are normalized to 1 with gm as a parameter.

3. (20) points

For the same circuit as in problem 1 above, place a resistor Rd between the two transistor drains. Assuming DC operation find the nonlinear v(i) description. Plot v versus i for normalized Rd=R=1, Io=1 and three values of gm (1/gm <, =, > R).