File: E:\courses\fall2007\610\hmwrk1.doc RWN 09/05/07

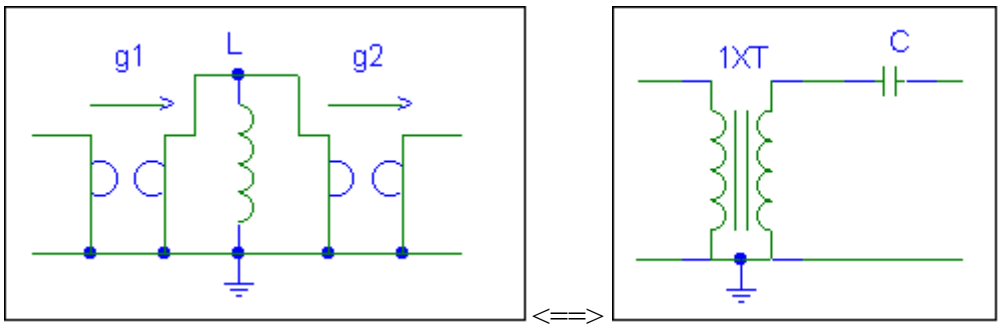
ENEE 610
Homework Problems for Grading, Set 1 (100 points)
Due at class W 09/12/07
2-ports and PSpice

1.(25 points)

a) Find as a function of s the chain matrix, $\mathbf{q}$ = [A B; C D], $[v_1\ i_1]^T = \mathbf{q}[v_2\ -i_2]^T$, for each of the following two 2-ports, showing that they can have identical port behavior. Assume the transformer is ideal.

b) Give the element values to achieve equality at the ports.

c) Give the Y matrix assuming identical port behavior.



2. (75 points) For the following circuit by adding Y matrices of the parallel left 2-ports, converting to the chain matrix, and multiplying by the chain matrix for the resistor:

a) Find the chain matrix for the full 2-port.

b) Find v_2/v_1 as a function of s.

c) For L1=L2=R=g1=1 run Spice to give the unit step response for v_2/v_1 when the gyration conductance g2 is a parameter taking the values of g2 = -3, -1, +1, +3. Do this over time from 0 to 5 seconds. You can make a gyrator as two G components in parallel (for the parameter g2 you need the Gvalue PSpice component). And you can use Vpulse with V1=0, V2=1, TD=0.1, TR=1p=TF, PW=10, PER=20. Compare with what you would get using v_2/v_1 of part b) above for the values g2=-1 and g2=+1.