ENEE 610
Homework Problems for Grading, Set 3 (100 points)
Due at class ~~W 10/05/05~~ M 10/10/05
Indefinite Admittance, input Y, adjoint circuit, Ev part

1. (50 points)

For the following circuit
a) find the indefinite admittance using the node numbers given
b) ground the bottom node to get the definite 5x5 admittance
c) use the result to eliminate internal nodes III, IV, and V. in two different ways
   c1) by eliminating first node III, then IV and then V
   c2) by eliminating all three at one time
   discuss the advantage of one method over the other
d) Call the resulting 2-port admittance Y. Load port 2 in a resistor of resistance r and find the input admittance at port 1.
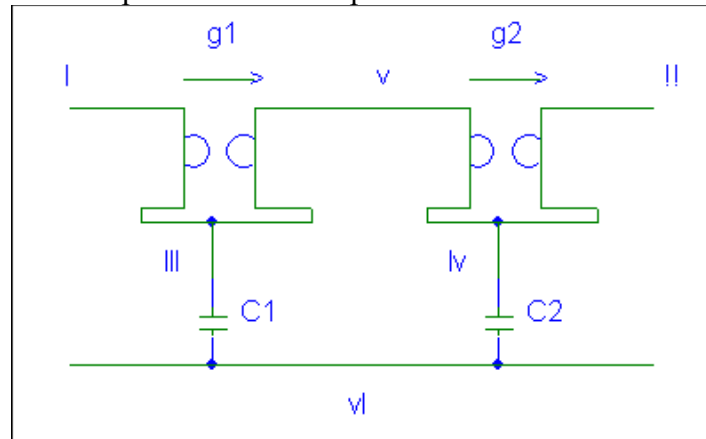
2. (50 points)

Consider the following circuit.
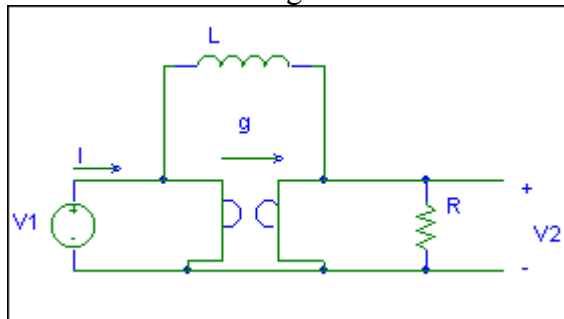
a) Draw the adjoint to the non-source portion of the circuit and set up sources on the adjoint in order to calculate the derivative of the transfer function V2/V1(s) with respect to the resistance R and also with respect to L. Calculate these derivatives using the adjoint and check by direct differentiation of the transfer function.
b) For the 2-port formed by the gyrator and the inductor, find the input admittance y(s) when loaded by a load of admittance yL(s) and then find yL(s) in terms of y(s). Check in the case that yL(s)=1/R (as shown in the above circuit diagram).
c) Form the even part of y(s) for a general load yL(s) and for the resistor load shown. From the latter find the zeros of the even part of y(s) when L=2, g=3, R=5.