ENEE 610 To Consider #8

1. Read chapter 11, pp. 450 - 479, on stability of linear and nonlinear networks.

2. Put into Spice the multiplier discussed in class. Check the range of the adder portion and of the multiplier itself.

Reference: K. Kimura, "An MOS Four-Quadrant Analog Multiplier Based on the Multitail Technique Using a Quadritail Cell as a Multiplier Core," IEEE Transactions on Circuits and Systems - I, Vol. 42, No. 8, August 1995, pp. 448 - 454.

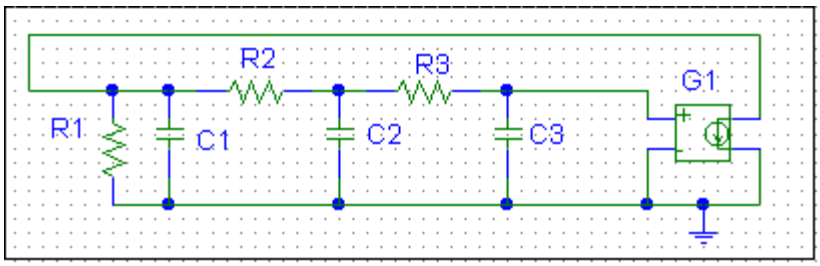
3. Use the multiplier of 2. above to realize the equations, where k is a parameter, -1<k<1.

$$\frac{dx}{dt} = (1-x)y$$

$$\frac{dy}{dt} = k(x-1)y$$

Show that (x,y)=(0,0) is an equilibrium point for this system and determine for what k the equilibrium point is a) stable, b) asymptotically stable, c) globally asymptotically stable.

4. For the circuit of 8. of To Consider #7 (repeated below), let node 1 be the at the junction of R1-C1-R2 and node 2 at the junction of R3-C3-G1. Set up the indefinite admittance matrix and from this by eliminating the internal node find the nodal admittance matrix. From that find the voltage at node 2 when a current source Iin is applied to node 1.



5. For the following bridged T find the "2-port" nodal admittance matrix by setting up the indefinite admittance matrix and eliminating internal nodes. Use this to show that Vout/Vin can have a zero in the right half plane for passive circuits.