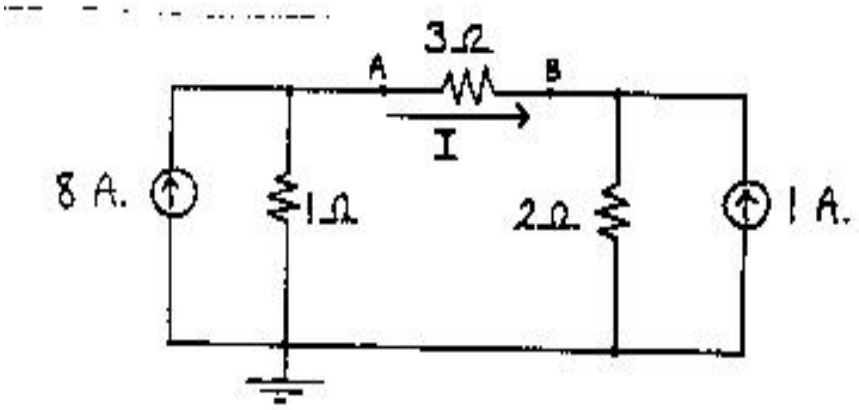
EE 42, Fall 1994
Midterm #2
Professor L. Murphy

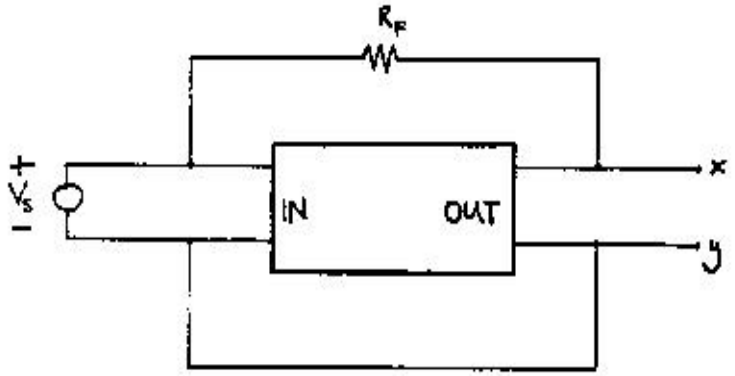
Problem #1. [20 points]

Find the value of the current *I* in the circuit below by first taking a Norton equivalent circuit at terminals *A* and *B*.



Problem #2. [20 points]

In the circuit below, the amplifier parameters *Ri*, *Ro and A are known, as are the voltage Vs and resistance Rf. Find the Thevenin equivalent circuit seen at terminals x and y in terms of these known quantities.*



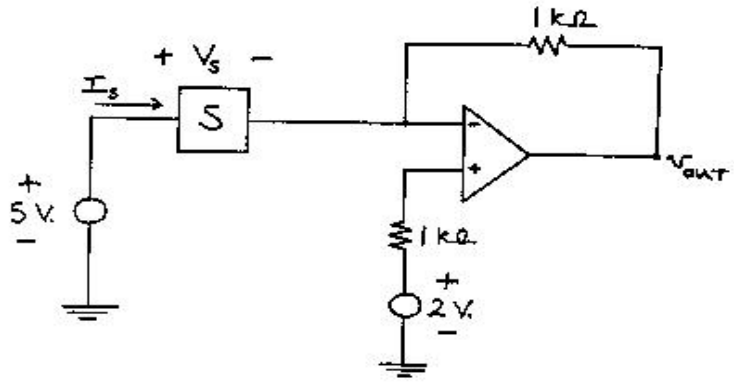
Problem #3. [20 points]

In the circuit below the nonlinear element *S* has *Vs* - *Is* relation

Is = Vs^2,

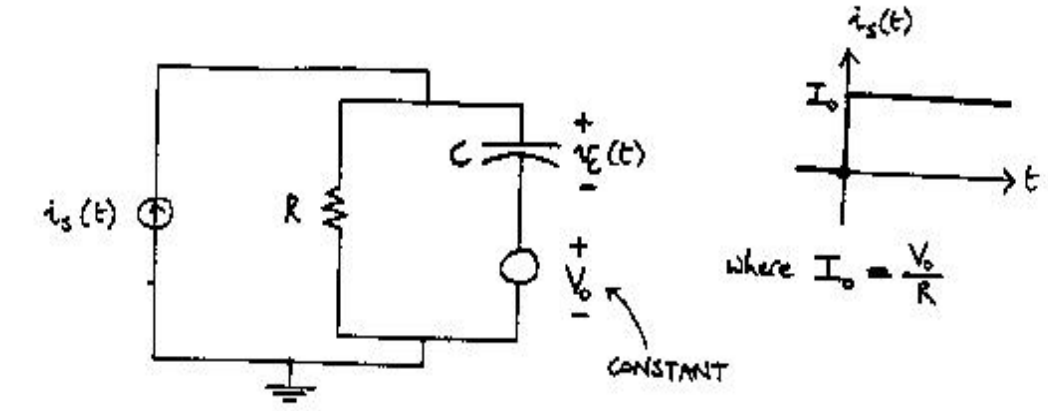
Is in mA., Vs in V.

Find the value of the voltage *Vout* in this circuit.



Problem #4. [20 points]

Find and plot the voltage *Vc(t)* for $t > 0$. Your plot should *clearly* show the time-constant *tau*, and the initial and final values of *Vc(t)*.



Problem #5. [20 points]

[3-input vote-taker with veto by C] There are 3 inputs to a digital system: *A*, *B* and *C*. Logical 1 means 'Yes', logical 0 means 'No'. The output *F* agrees with the majority of the inputs, except *F* votes No whenever *C* votes No.

(a) Fill in the Truth Table below for this system.

(b) Draw a realization for this system which uses *at most* 2 logic gates.

A	B	C	F
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Solutions!
