EECS 210 – Midterm Exam 1 – Pre–Test – 2/04/01
Closed Book, No Notes, Calculators ALLOWED, 50 minutes

Name: _____

I have neither given nor received aid on this exam, nor have I concealed any violation of the Honor Code.
Signature: _____

Note: If it appears that necessary information is missing from a problem, make a reasonable assumption and state the assumption.

5% 1. Linearity of circuit elements is unnecessary for superposition to work (True/False). ____

5% 2. Current sources reduce the number of loop equations that must be considered in a mesh analysis (True/False). ____

5% 3. Two points held at the same voltage is equivalent to an open circuit (True/False). _____

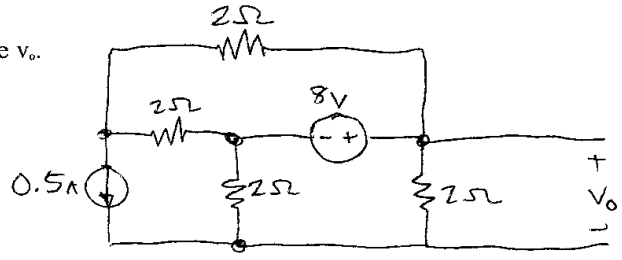
5% 4. An infinite resistance is equivalent to an open circuit (True/False). _____

Please present analyses and solutions to the following problems in your blue book. Your final answers should be designated by drawing boxes around them. Please include your name and lecture section on the cover of the blue book. Do not worry that your exam sheet and blue book might become separated.

HINT: Use the techniques of superposition, nodal analysis, or mesh analysis to solve the following three circuit problems.

15% 5. Find the output voltage v_o.

$V_o = 3.5\,V$

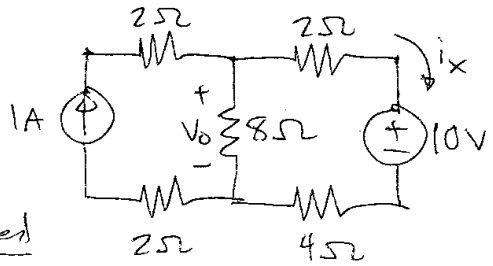


25% 6. What is v_o? What is i_x? Is power dissipated or delivered by the 10 V source?

$V_o = \frac{64}{7}\,V$

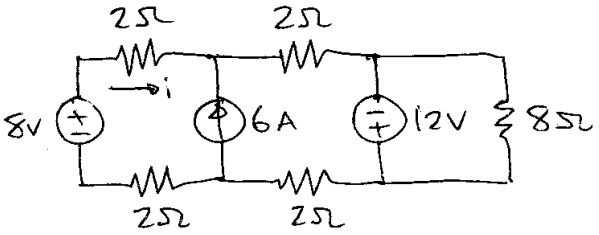
$i_x = -\frac{1}{7}\,A$

power delivered



20% 7. Find the current i.

$i = -\frac{1}{2}$ A



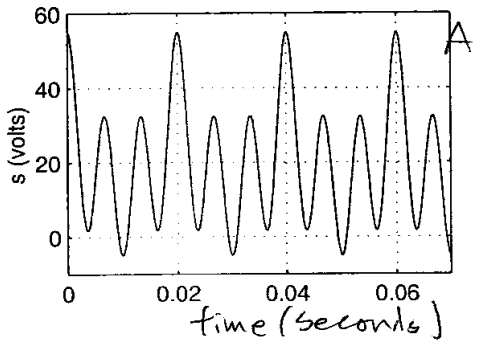
8. A signal waveform $s(t)$ is pictured in Figure A. Recall the concept of a Fourier series representation of $s(t)$:

$$s(t)=A_o+\sum_{n=1}^{\infty} A_n\cos(n\omega_o t)+B_n\sin(n\omega_o t)$$

5% a) Explain why $B_n=0$ for all n in the Fourier series representation of $s(t)$. even

5% b) Explain why the fundamental frequency is 50 Hz. $T = 0.02$ s

10% c) The signal $s(t)$ is applied a circuit (or system) called a "low-pass filter" with gain and phase plots shown in Figures B and C, respectively. Draw $v_o(t)$, the output signal, and clearly mark its amplitude. Use the same time reference as used for $s(t)$



only A_0 term gets through