ECE 4810
Spring 2010
Circuit Analysis Review Sheet

~/wmu/courses/ece320/ReviewSheet

Topics

1. Complex Numbers
2. Bode plots
3. Ohm's Law
4. Kirchoff's Laws
5. Laplace Transformation
6. Transfer Functions
7. Thevenin's and Norton's Theorems
8. Input and Output Resistance and Voltage Gains of Resistive Networks

REVIEW PROBLEMS

See last page for figures.

1. Perform the following operations:
   (a) express $1 - 3j$ in polar form
   (b) express $-1 + 3j$ in polar form
   (c) express $2\angle 30°$ in rectangular form
   (d) find the magnitude of $1 + j$
2. Plot the magnitude of
$$T(s) = \frac{1}{s+1} \tag{1}$$
in dB (e.g. $20\log(|T(j\omega)|)$ where $s = j\omega$. Use a log scale on the frequency axis. Also plot the angle of the complex number $T(j\omega)$ vs. ω, also using a log scale on the frequency axis. **For both plots, provide a table of sample points**; include computations used to obtain these points.
3. Find I.
4. Setup the equations needed to solve for I_1, I_2, and I_3.
5. Setup the integrodifferential equations needed to solve for v_1 and v_2. Assume zero initial conditions in L and C.

6. Thevenize the circuit "looking into" nodes A-A'. Find the input resistance "seen" by V, the circuit output resistance ("looking into" nodes A-A'), and the voltage gain $V_{AA'}/V$.

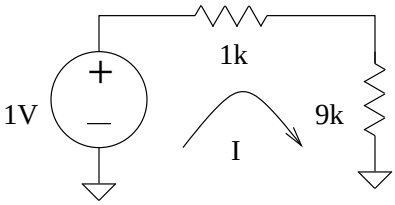
7. Thevenize the circuit "looking into" nodes A-A'. Find the input resistance "seen" by V, the circuit output resistance ("looking into" nodes A-A'), and the voltage gain $V_{AA'}/V$.

8. Nortonize the circuit "looking into" nodes A-A'.

9. Find the transfer function $T(s) = V_o(s)/V_i(s)$.

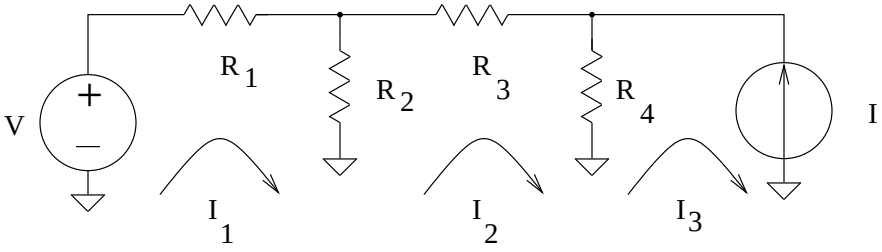
10. Find $v_o(t)$ for the circuit of question 9 if $v_i(t)$ is a step function of height A volts. Assume the capacitor is initially uncharged.

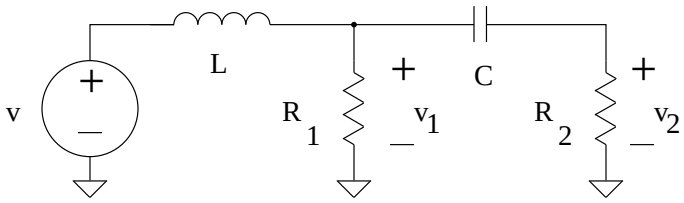
11. What two effects can a linear circuit have on an input sinusoid in the steady state?



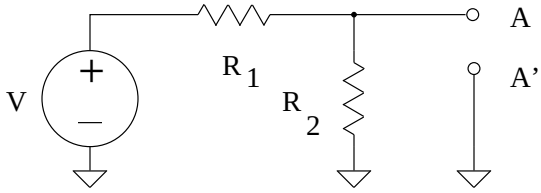
problem 3

problem 4

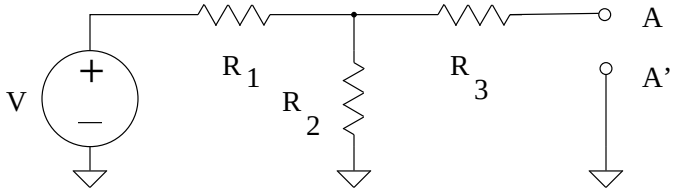




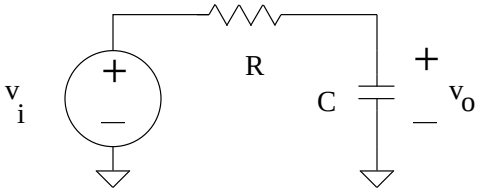
problem 5



problem 6
problem 8



problem 7



problems 9,10