1. a) Please explain what is the Thevenin's theorem [5] and provide the proof of that. [10]

2. Use superposition to find V_1 in the circuit of Figure 1. [15]

3. For the circuit shown in Figure 2 with input voltage V_{in}=3V, please determine the output voltage V_o under the following conditions: a) the op-amp is ideal [5]; b) the op-amp is not ideal and has the following parameters: input resistance R_i=500kΩ, output resistance R_o=200Ω, and voltage gain A_v=2x10^4. [15]

4. A 10V_{rms} sinusoidal AC voltage source is supplying the power to a series connected RLC network with R= 0.2Ω, L= 20 μH, and C= 5 μF. Please determine the expression of **energy**, $E_L(t)$, stored inside the inductor L if the frequency of the voltage source is: a) 60Hz; b) 16kHz. [10]

5. For the circuit shown in Figure 3, a 1Ω resister is shorted by closing the switch at t=0. Please determine the inductor current $i_L(t)$ for t>0. [20]

6. The s-domain transfer function of a complex network can be expressed as: $H(s) = \frac{s+10}{s^2+s}$. Please draw the bode plots (both magnitude and phase) of H(s). Please clearly mark those critical points and the slopes of those curves. [20]

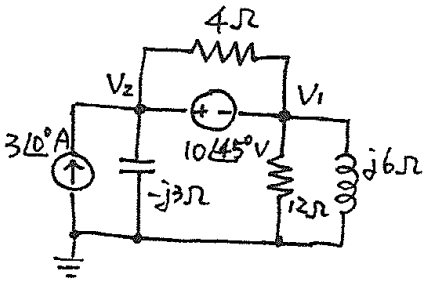

Figure 1

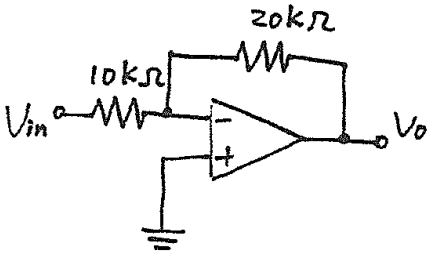

Figure 2

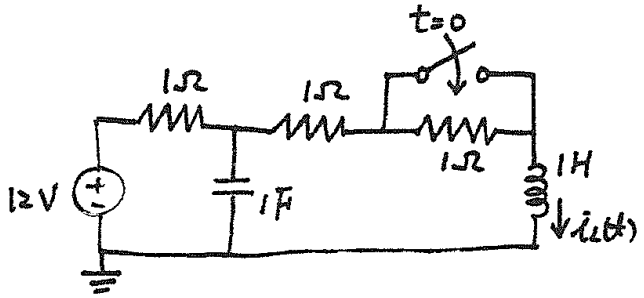

Figure 3

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