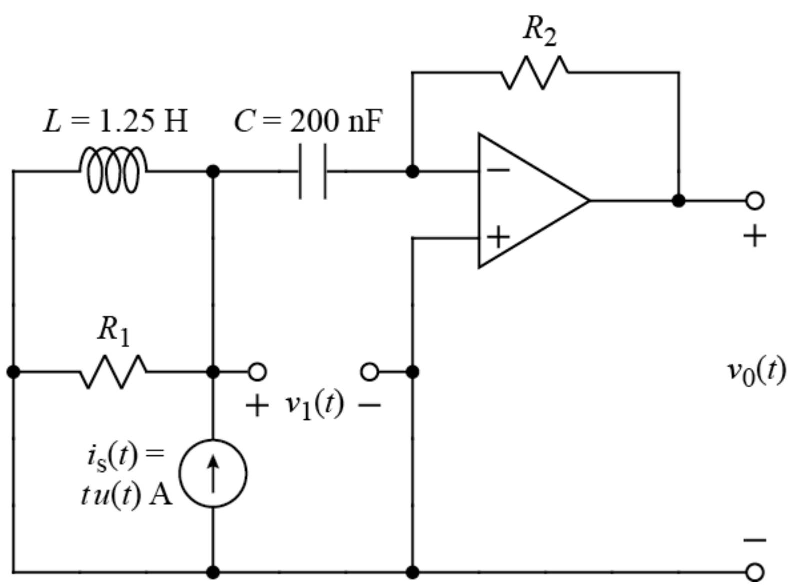
HOMEWORK #10

1.



The current source in the above circuit is off for $t < 0$.

Find a symbolic expression for the Laplace-transformed output, $\mathbf{V}_o(s)$, in terms of not more than R_1, R_2, L, C, and values of sources or constants.

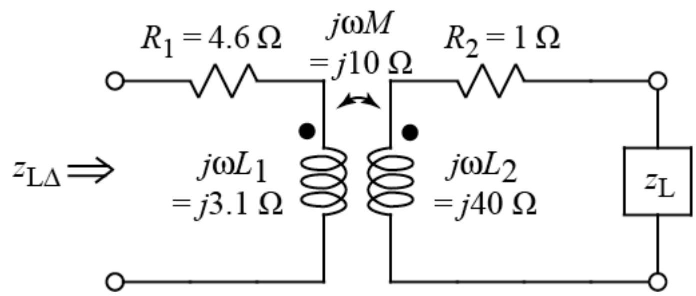
2. Choose a numerical value for R_1 for the circuit in problem 1 to make

$$v_1(t) = v_m - v_m e^{-\alpha t}\left[\cos(\beta t) + \frac{1}{2}\sin(\beta t)\right]$$

where v_m, α, and β are real-valued constants.

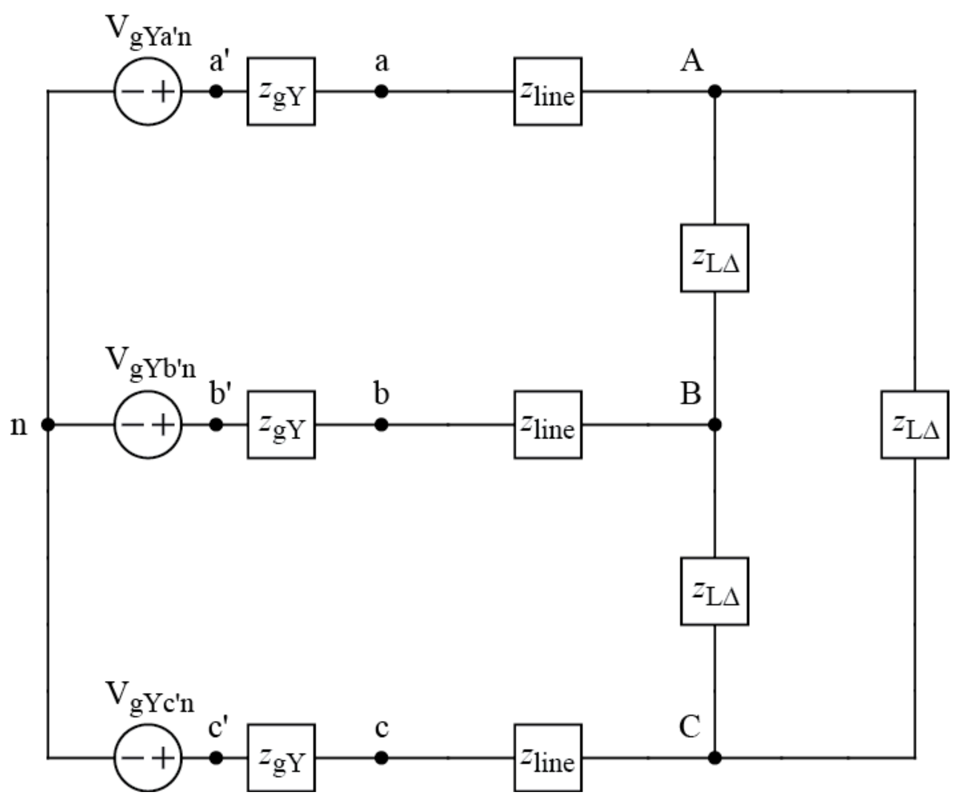
Hint: C behaves as though it is in parallel with L and R_1.

3.



Find the value of load impedance, z_L, that makes $z_{L\Delta} = 24.6 - j36.9\ \Omega$. Note that $z_{L\Delta}$ is the equivalent impedance of the entire circuit.

4.



$V_{gYa'n} = 67\angle 0°$ V $\quad z_{gY} = 11.9 + j19.7\ \Omega$

$V_{gYb'n} = 67\angle -120°$ V $\quad z_{line} = j6\ \Omega$

$V_{gYc'n} = 67\angle +120°$ V $\quad z_{L\Delta} = 24.6 - j36.9\ \Omega$

For the above 3-phase balanced circuit, find the numerical value of the phasor current $\mathbf{I}_{CA}$.

5. For the above 3-phase balanced circuit, find the numerical value of the phasor voltage $\mathbf{V}_{b'a'}$.