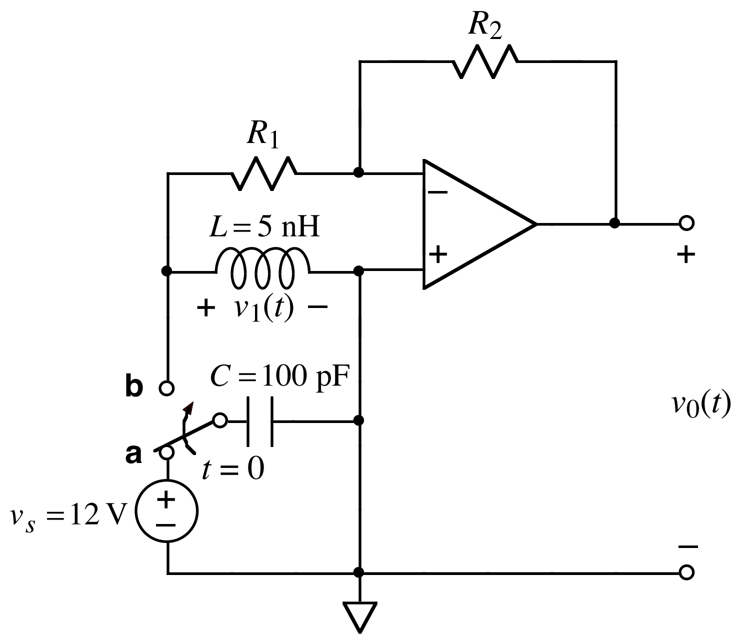
HOMEWORK #10

1.



After being in position **a** for a long time, the switch moves to position **b** at time $t = 0$.

Find a symbolic expression for the Laplace-transformed output, $\mathbf{V}_0(s)$, 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 to make

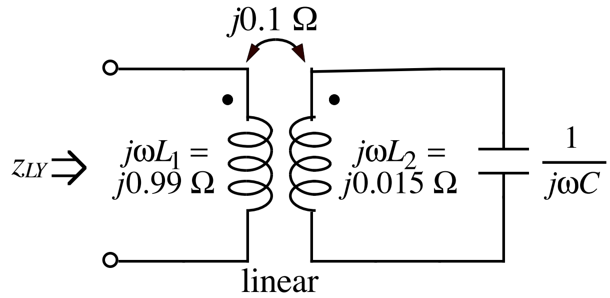
$$v_1(t) = v_m e^{-\alpha t}[\cos(\beta t) - \sin(\beta t)]$$

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

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

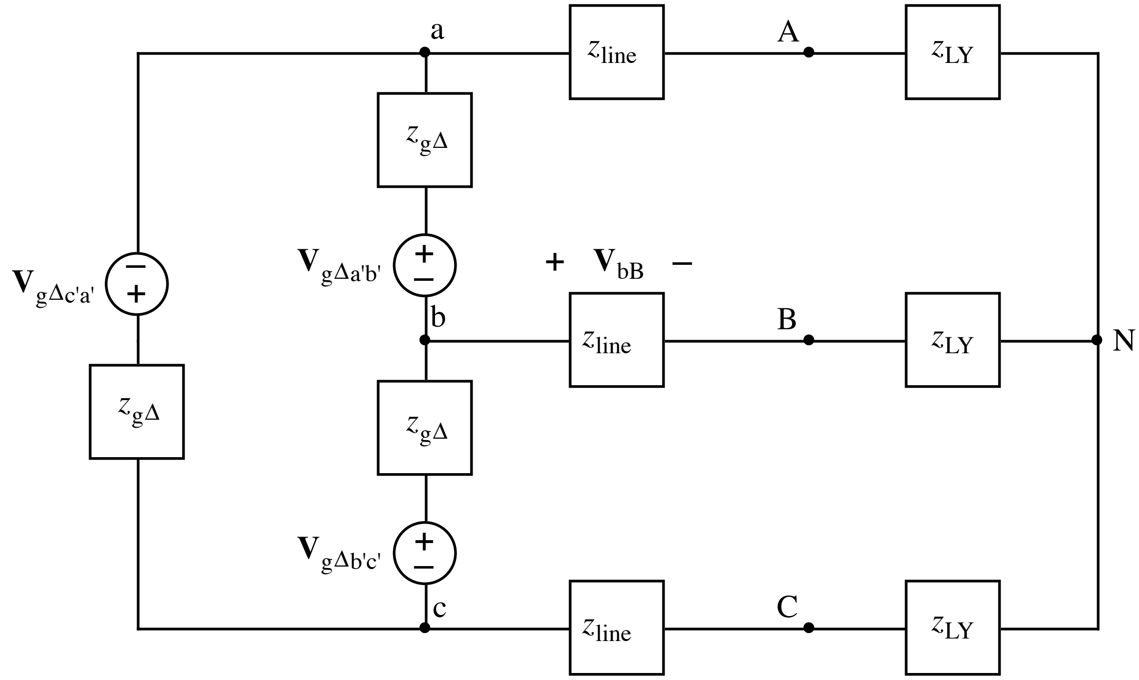
Hint: $s = s + \alpha - \alpha$.

3.



Given $\omega = 1\,\mathrm{M\,rad/s}$, find the value of C that makes $z_{\mathrm{LY}} = -j1.01\,\Omega$. Note that z_{LY} is the equivalent impedance of the entire circuit.

4.



$\mathrm{V}_{\mathrm{g\Delta a'b'}} = 168\angle 0°$ V $\qquad z_{\mathrm{g\Delta}} = j0.9\ \Omega$

$\mathrm{V}_{\mathrm{g\Delta b'c'}} = 168\angle -120°$ V $\qquad z_{\mathrm{line}} = j1.68\ \Omega$

$\mathrm{V}_{\mathrm{g\Delta c'a'}} = 168\angle +120°$ V $\qquad z_{\mathrm{LY}} = -j1.01\ \Omega$

For the above 3-phase balanced circuit, find the single-phase equivalent model.

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