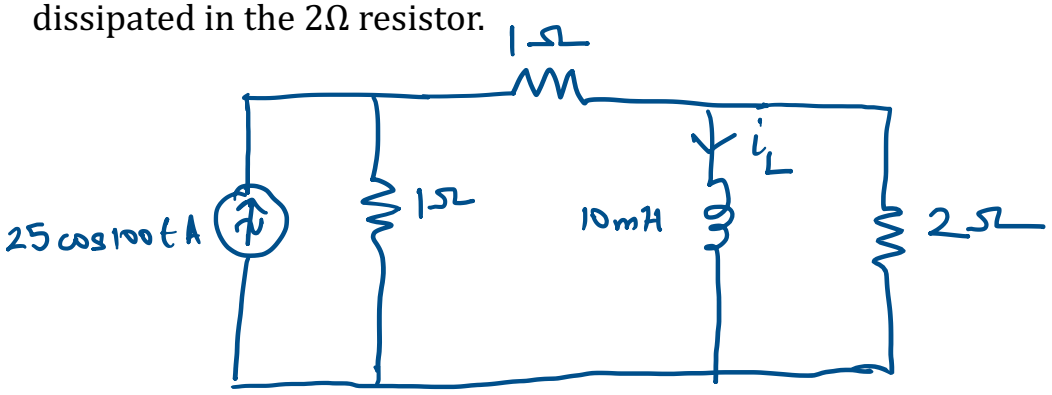
Practice Sheet 1

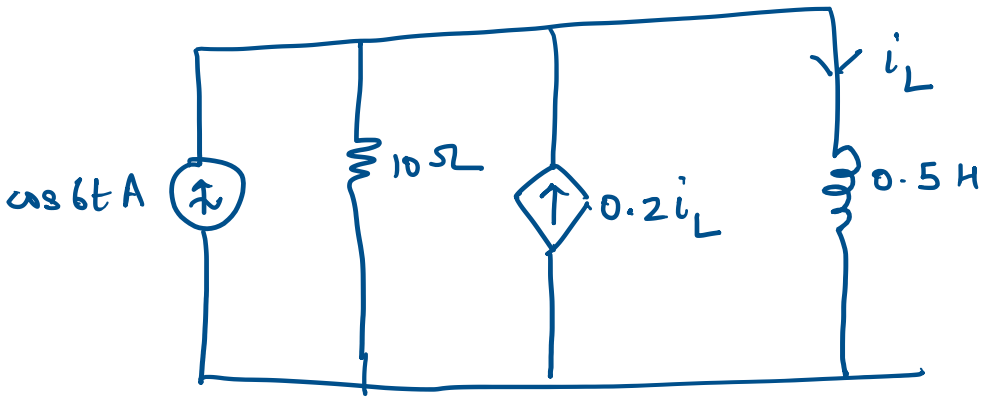
Chapter 10 of Hayt – Kemmerly, 8th Edition

- Evaluate $5\ \sin(5t - 9°)$ at $t = 0.01, 0.1\ s$
- Express $2.7\ \sin(50t + 5°) - 10\cos(50\ t)$ as a single cosine function
- Determine which waveform in the following pair is lagging, $\cos(4t + 80°), \cos 4t + \sin 4t$

- Assuming there are no longer any transients present, determine the current labeled i_L in the following circuit. Also calculate the power dissipated in the 2Ω resistor.

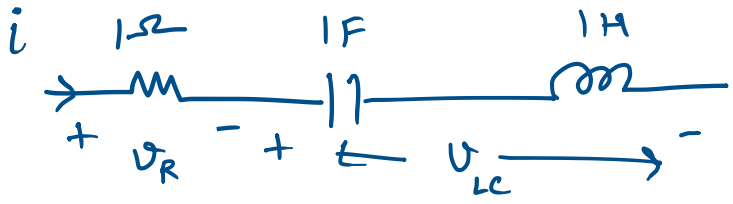


- Find i_L in the following circuit. Also find the power dissipated in the 10Ω resistor.

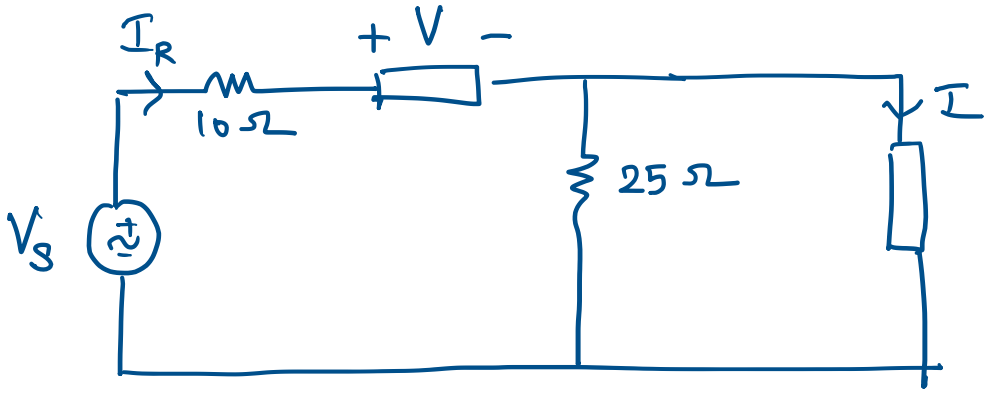


- Express the following in both rectangular and polar forms
  - $\frac{2+j3}{1+8\angle 90^\circ} - 4$
  - $\left[\frac{(1-j)(1+j)+1\angle 90^\circ}{-j}\right](3\angle -90^\circ) + \frac{j}{5\angle -45^\circ}$

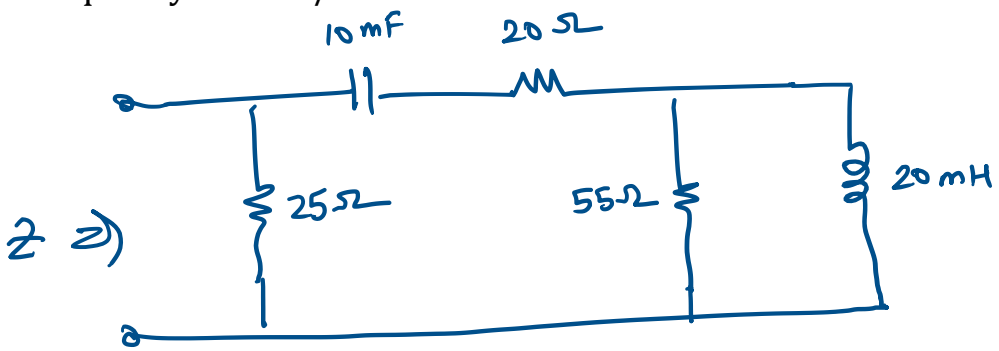
- Transform the following into phasor form
  - $3\ \cos 100t - 3\sin 100t$
  - $-\sin(8000t + 14°)$
- Assuming an operating frequency of 1 KHz, transform the following phasor expression, $\frac{2\angle 31°}{4\angle 25°}$, into a single cosine function in the time domain. Compute the instantaneous value at $t = 10ms$ and $t = 25\ ms$
- A series connection is formed between a 1Ω resistor, a 1F capacitor and a 1 H inductor in that order. Assuming operation at $\omega = 1rad/s$, what is the phasor current which yields a voltage of $1\angle 30°\ V$across the resistor. (b) Compute the ratio of the phasor voltage across the resistor to the phasor voltage which appears across the capacitor-inductor combination.



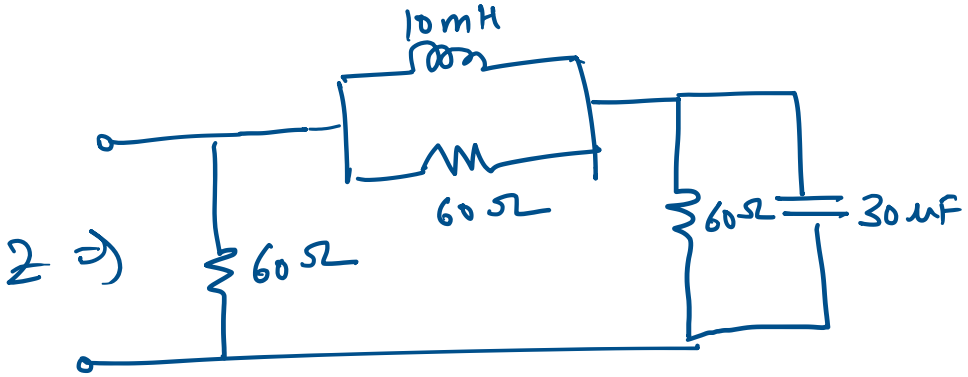
- The circuit show below is represented in the phasor/frequency domain. If $I_R = 4\angle 35°A$, $V = 10\angle 35°V$ and $I = 2\angle 35°A$,] across what type of element does V appear, and what is its value?



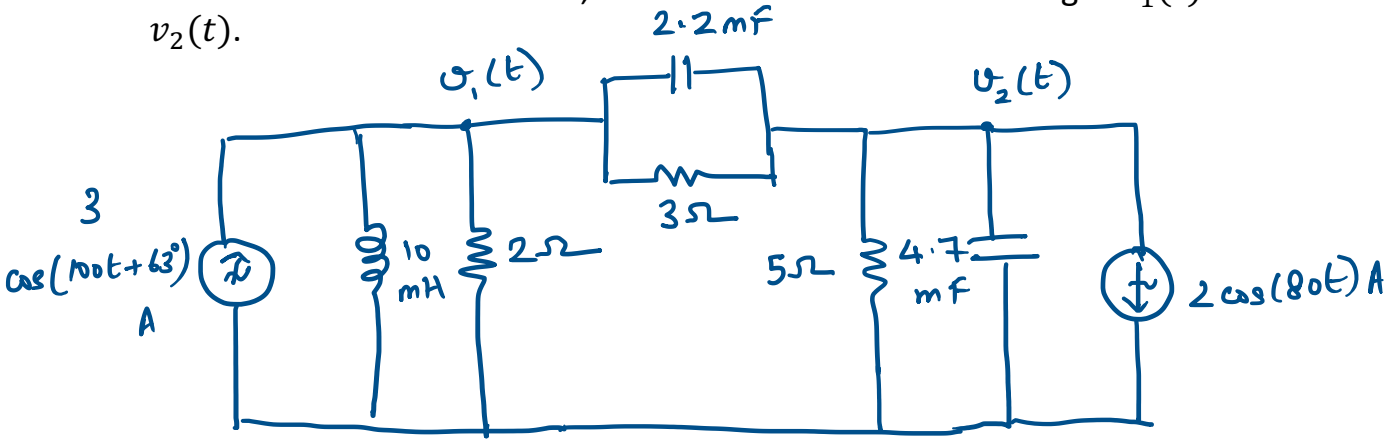
- Consider the network depicted in the figure, and determine the equivalent impedance seen looking into the open terminals if the angular frequency is 1 rad/s.



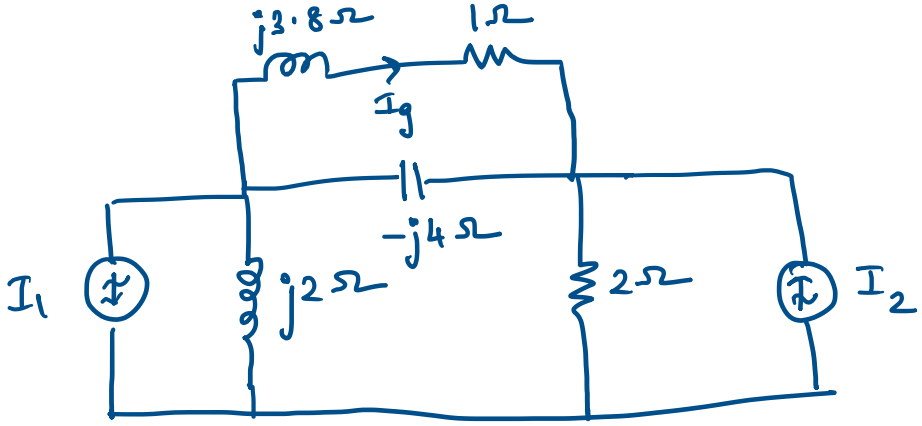
- Calculate the equivalent impedance seen at the open terminals of the network shown below if the frequency is 1 Hz.



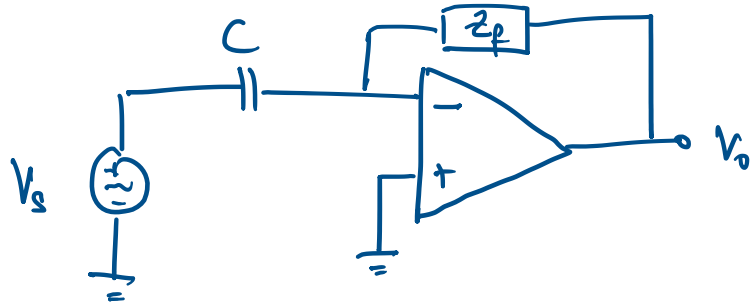
- For the circuits shown below, determine the two nodal voltages $v_1(t)$ and $v_2(t)$.



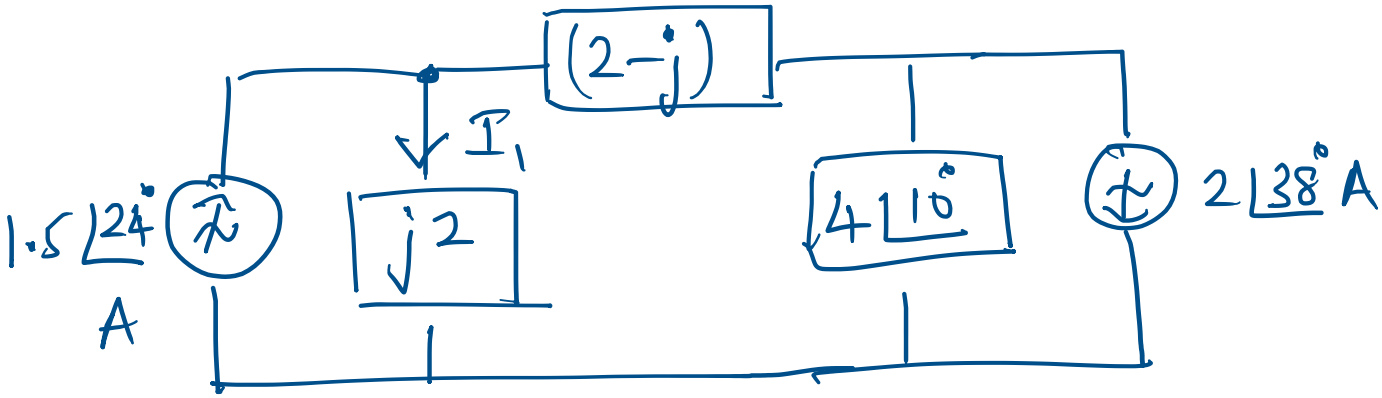
- Determine I_g in the circuit if $I_1 = 5\angle -18°A$ and $I_2 = 2\angle 5°A$.



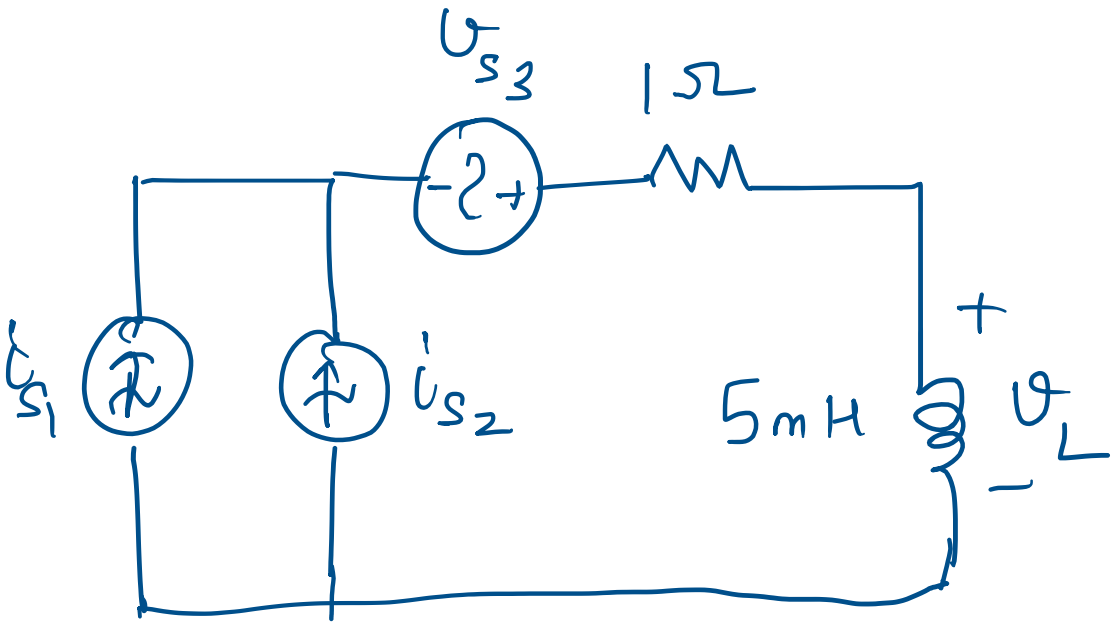
- Consider the ideal op-amp in the circuit shown below. What is $\frac{V_0}{V_s}$?



- Obtain the Thevenin equivalent seen by the $(2 - j)\Omega$ impedance and employ it to determine the current I_1.



- In the circuit shown below, $i_{s1}(t) = 8\ \cos(4t - 9°)A$, $i_{s2}(t) = 5\ \cos(4t)A$, and $v_{s3}(t) = 2\ \sin(4t)V$. Using source transformation, calculate the voltage across the inductor.



- In the circuit shown below, find values of I_1, I_2 and I_3