The Ohio State University
Department of Electrical Engineering

ECE 205

Circuit Analysis

Home work Set # 8

Print Your Name

_____

Problem#1: Problem 8-1 textbook

Transform the following sinusoids into phasor form and draw a phasor diagram. Use the additive property of phasors to find $v_1(t)+ v_2(t)$.

a) $v_1(t) = 250\cos(\omega t + 60°)\text{V}$

b) $v_2(t) = 100\cos(\omega t) + 150\sin(\omega t)\text{V}$

Problem#2: Problem 8-3 textbook

Convert the following phasors into sinusoidal waveforms.

a) $\mathbf{V}_1 = 10e^{-j30°}V, \omega = 10^4\ rad/s$

b) $\mathbf{V}_2 = 60e^{-j220°}V, \omega = 10^4\ rad/s$

c) $\mathbf{I}_1 = 5e^{j90°}A, \omega = 200 rad/s$

d) $\mathbf{I}_2 = 2e^{j270°}A, \omega = 200 rad/s$

Problem#3: Problem 8-6 textbook

Convert the following phasors into sinusoids:

a) $\mathbf{V}_1 = 20 + j25V, \omega = 10 rad/s$

b) $\mathbf{V}_2 = 5(8 - j3)V, \omega = 20 rad/s$

c) $\mathbf{I}_1 = 12 - j5 + \dfrac{4}{j}A, \omega = 300 rad/s$

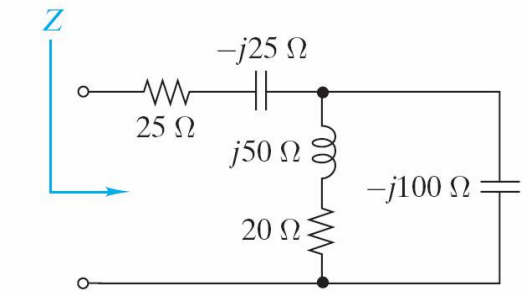
d) $\mathbf{I}_2 = \dfrac{3 + j8}{2 - j6}A, \omega = 50 rad/s$

Problem#4: Problem 8-10 textbook

Given a sinusoid $v_1(t)$ whose phasor is $\mathbf{V}_1 = -3 + j4\ \text{V}$, use phasor methods to find the voltage $v_2(t)$ that leads $v_1(t)$ by 90° and has an amplitude of 10 V.

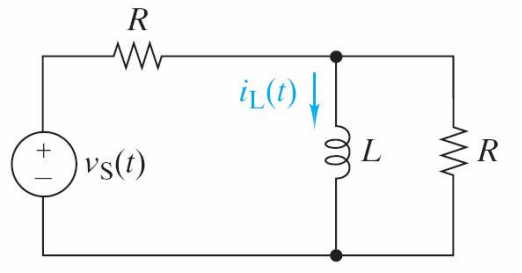
Problem#5: Problem 8-12 textbook

Find the equivalent impedance Z in the circuit. Express the result in both polar and rectangular form.



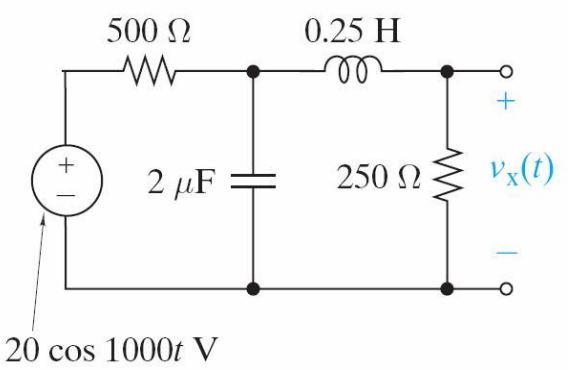
Problem#6: Problem 8-22 textbook

The circuit is operating in the sinusoidal steady state with $v_S(t) = V_A \cos(\omega t)$. Derive a general expression for the phasor response I_L.



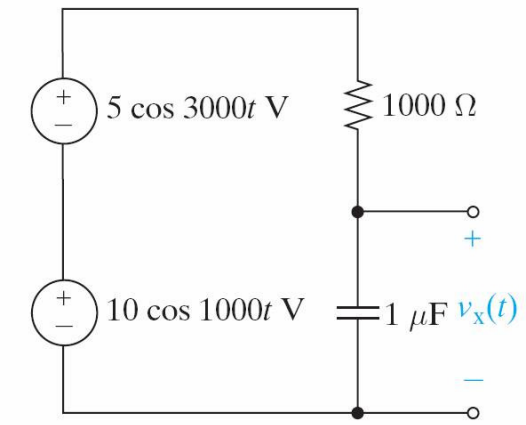
Problem#7: Problem 8-26 textbook

The circuit is operating in sinusoidal steady state. Find the steady state response $v_x(t)$.



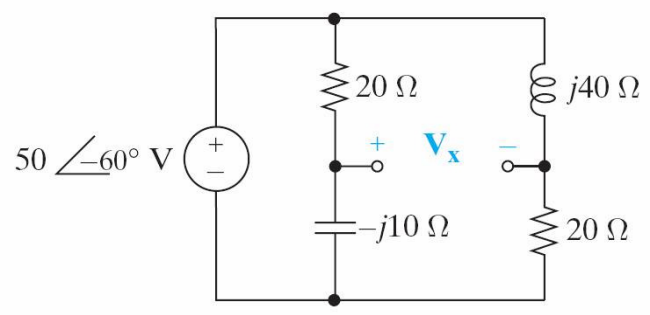
Problem#8: Problem 8-30 textbook

The circuit is operating in sinusoidal steady state. Use superposition to find the response $v_x(t)$. *Note:* the sources do not have the same frequency.



Problem#9: Problem 8-32 textbook

The circuit is operating in the sinusoidal steady state. Find the phasor response $\mathbf{V}_x$.



Problem#10: Problem 8-41 textbook

The circuit is operating in the sinusoidal steady state with ω=4 krad/s. Use node-voltage analysis to find the steady-state response $v_x(t)$.