

**EE233 HW1**

Oct. 3rd

Due Date: Oct. 10th

Problems from the textbook: P.9.49, P.9.59, and P.9.60

1. At  $t = -2ms$ , a sinusoidal voltage is known to be zero and going positive. The voltage is next zero is  $t = 8ms$ . It is also known that the voltage is  $80.9V$  at  $t = 0ms$ .
  - a) What is the frequency of voltage  $v$  in hertz?
  - b) What is the expression for  $v$ ?
  
2. A  $10\ \Omega$  resistor and  $5\ \mu F$  capacitor are connected in parallel. This parallel combination is also in parallel with the series combination of  $8\ \Omega$  resistor and a  $300\ \mu H$  inductor. These three parallel branches are driven by a sinusoidal current source whose current is  $922\cos(20000t + 30^\circ)A$ .
  - a) Draw frequency-domain equivalent circuit.
  - b) Reference the voltage across the current source as a rise in the direction of the current, and find the phasor voltage.
  - c) Find the steady-state expression for  $v(t)$ .
  
3. Find the impedance  $Z_{ab}$  in the circuit seen in below. Express  $Z_{ab}$  in both polar and rectangular form.

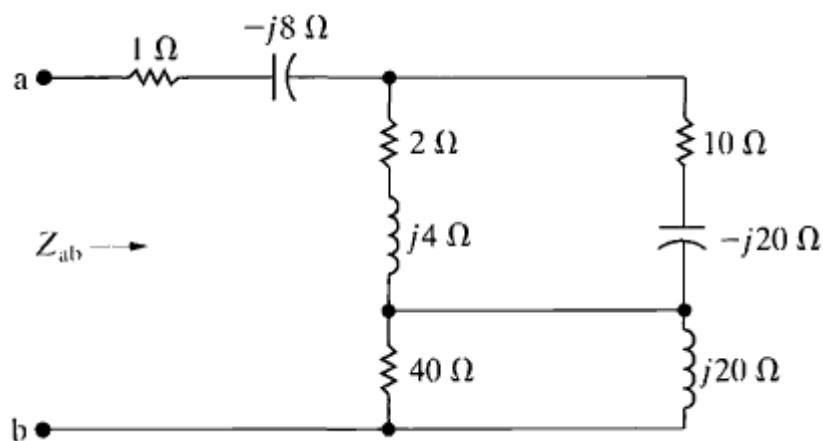


Figure Problem 3

4. Solve:

- The frequency of the source voltage in the circuit below is adjusted until  $i_g$  is in phase with  $v_g$ . What is value of  $\omega$  in radian per second?
- If  $v_g = 20 \cos(\omega t) [V]$  where  $\omega$  is the frequency found in part a, what is the steady-state expression for  $v_o$ ?

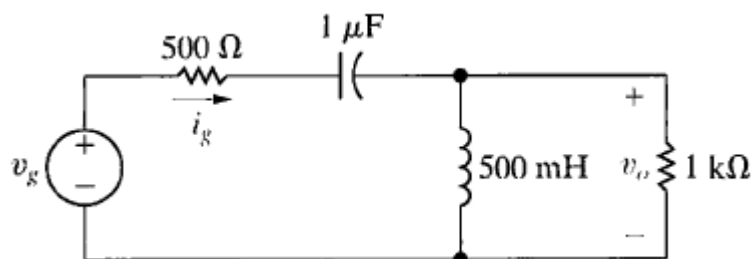


Figure Problem 4