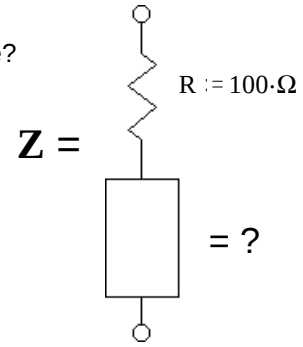
ECE 3600 homework 2B

a

1. $\mathbf{Z} = |\mathbf{Z}| \cdot e^{-j \cdot 30 \cdot deg}$ We don't know its magnitude, but its phase angle is -30°.

   Z is made of a 100Ω resistor in series with one other part. What is the part? type and value?

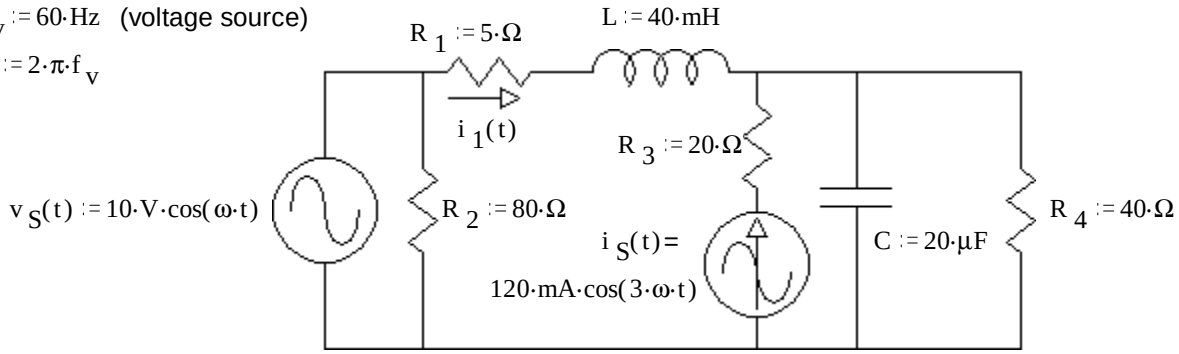
   $f := 60 \cdot Hz$ $\omega := 2 \cdot \pi \cdot 60 \cdot Hz$



2. The circuit shown has two sources. The frequency of the current source is the third harmonic of the voltage source. Using superposition, find the current $i_1(t)$. Be sure to redraw the circuit twice as part of your solution. $i_1(t) = ?$

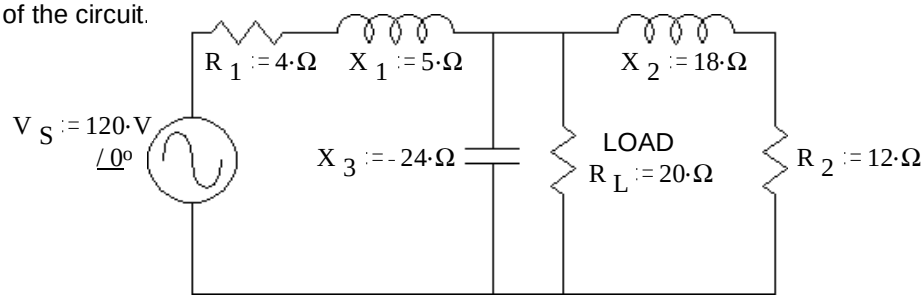
   $f_v := 60 \cdot Hz$ (voltage source)

   $\omega := 2 \cdot \pi \cdot f_v$



ECE 3600 homework 2B p2

3. a) In the circuit below R_L is the load resistor. Find and draw the Thevenin equivalent of the rest of the circuit.



b) Use the Thevenin equivalent to find the current through the load resistor and the voltage across the load resistor.

c) Find a replacement for R_L in order to maximize the power delivered to R_L.

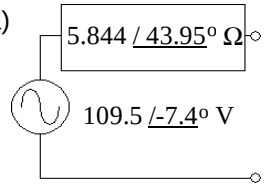
d) Find the new current and voltage for the load resistor.

Answers

1. $45.9 \cdot \mu F$

2. $i_1(t) := 239 \cdot mA \cdot \cos(\omega \cdot t - 5.5 \cdot deg) + 96.1 \cdot mA \cdot \cos(3 \cdot \omega \cdot t + 94.7 \cdot deg)$

3. a)



b) 4.46 /-16.9° A
89.2 /-16.9° V

c) 5.844 Ω

d) 10.1 /-29.4° A
59.1 /-29.4° V