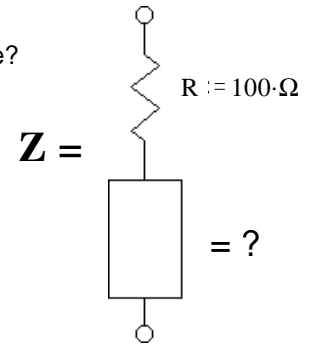


1.  $Z = |Z| \cdot e^{-j \cdot 30 \cdot \text{deg}}$  We don't know its magnitude, but its phase angle is  $-30^\circ$ .

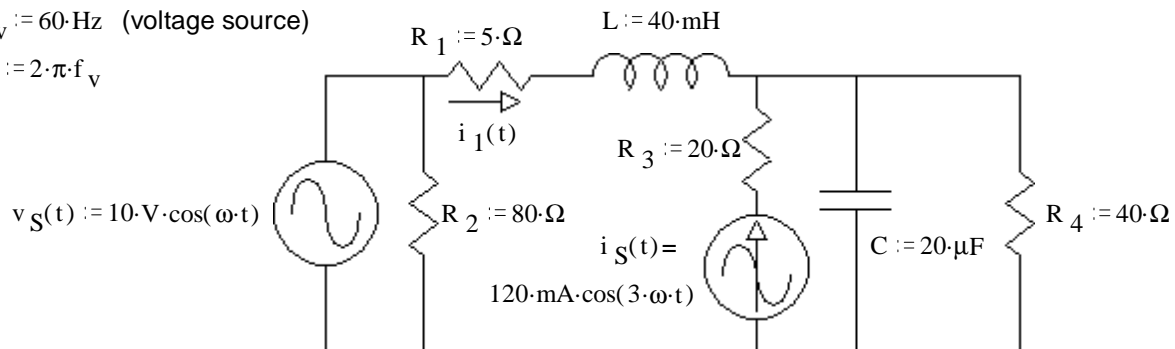
$Z$  is made of a  $100\Omega$  resistor in series with one other part. What is the part? type and value?

$f := 60 \cdot \text{Hz}$        $\omega := 2 \cdot \pi \cdot 60 \cdot \text{Hz}$



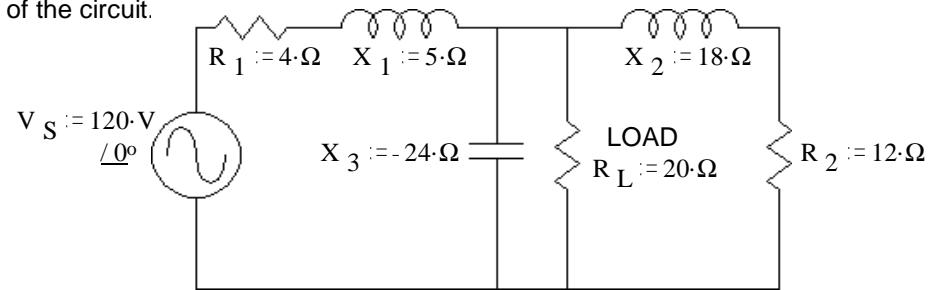
2. The circuit shown has two sources. The frequency of the current source is the third harmonic of the voltage source. Using superposition, find the current  $i_1(t)$ . Be sure to redraw the circuit twice as part of your solution.  $i_1(t) = ?$

$f_v := 60 \cdot \text{Hz}$  (voltage source)  
 $\omega := 2 \cdot \pi \cdot f_v$





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.

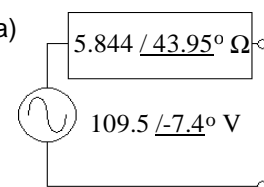
### Answers

1.  $45.9 \cdot \mu\text{F}$

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

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3. a)



b)  $4.46 \angle -16.9^\circ \text{ A}$

$89.2 \angle -16.9^\circ \text{ V}$

c)  $5.844 \Omega$

d)  $10.1 \angle -29.4^\circ \text{ A}$

$59.1 \angle -29.4^\circ \text{ V}$