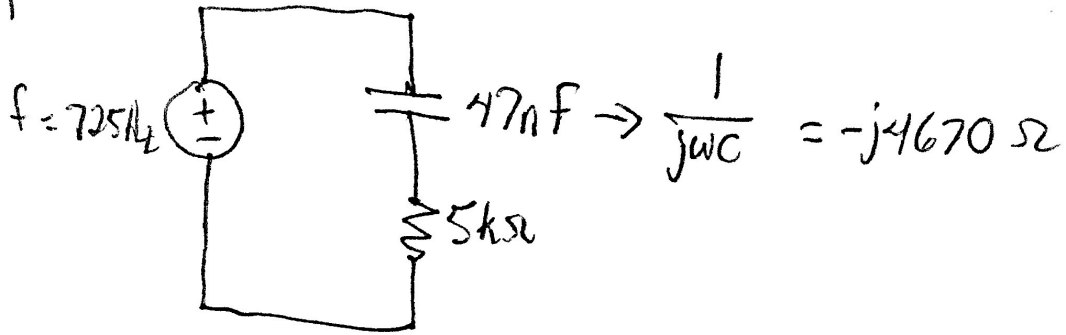


#1



$$\omega = 2\pi f = 4555 \text{ rad/s}$$

como están en serie la corriente es la misma

$$|V_C| < |V_R|$$

$$Z = 5000 - j4670 \Omega = 6842 \angle -43.04^\circ \Omega$$

forma rectangular forma polar

#2

$$pf = 0.90 \quad f = 60\text{Hz} \quad \omega = 2\pi f \quad L = 0.1\text{H} \quad R = 40\Omega$$

$$I_M = \frac{10\angle 0^\circ}{R + j\omega L} = \frac{10\angle 0^\circ}{40 + j37.7} = 1.43 - j1.35 \text{ A} = 1.96 \angle -43.30^\circ \text{ A}$$

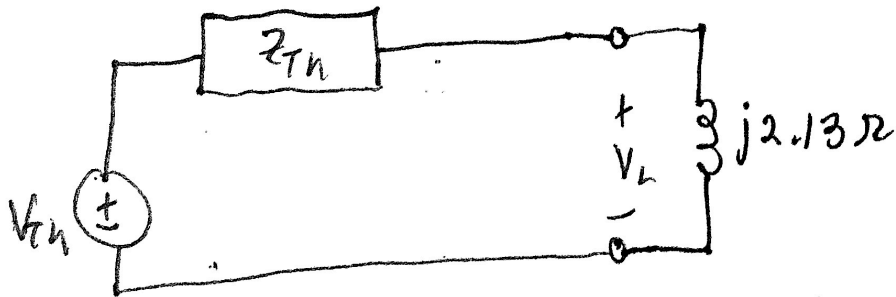
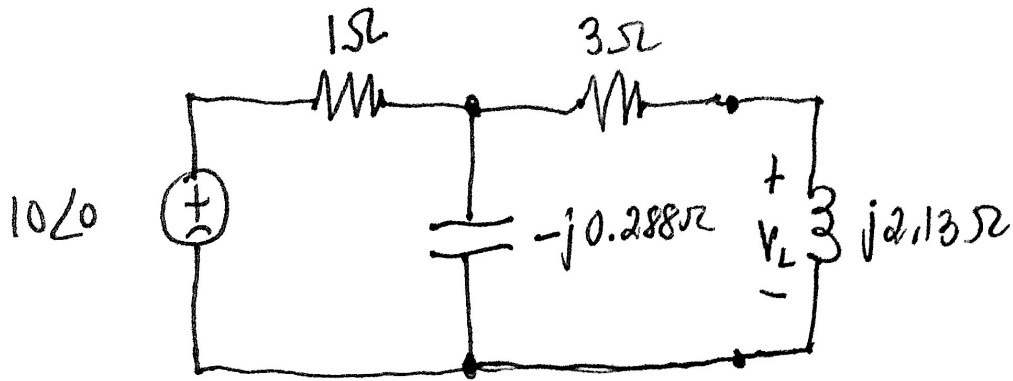
la corriente del capacitor es imaginaria así que la suma mantiene la parte real constante $pf = 0.90 \Rightarrow 0.9 = \cos \theta$

$$\theta = 25.84^\circ \quad \begin{array}{c} \text{I}_{\text{Im}} \\ \text{I}_{\text{Im}} \\ 1.43 \end{array} \quad I_{\text{Im}} = 1.43 \tan 25.84^\circ = 0.69$$

$$I_c = 1.35 - 0.69 = 0.66 \text{ A} \Rightarrow j\omega C V = j0.66$$

$$C = \frac{0.66}{\omega V} = \frac{0.66}{120\pi (108)} = 16 \mu\text{F}$$

#3



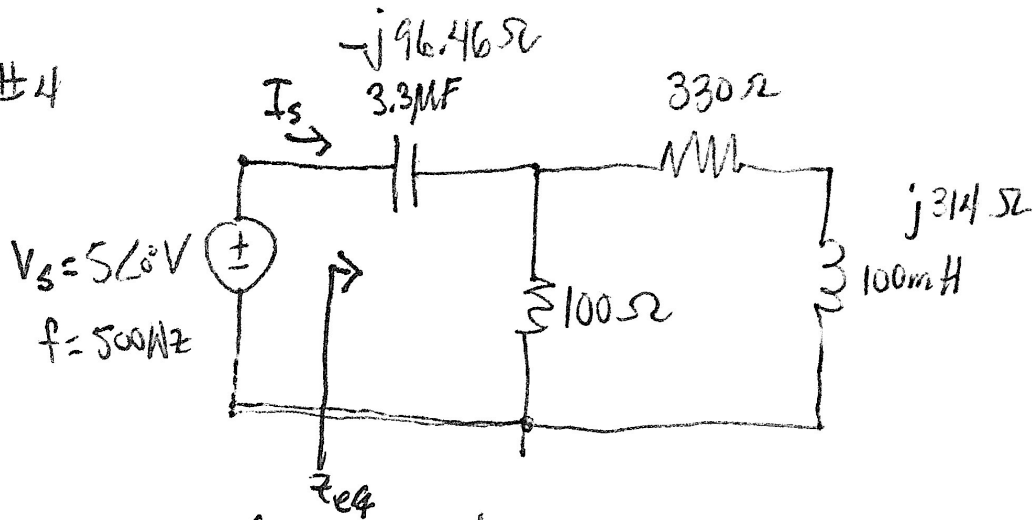
$$Z_{TH} = 3.08 - j0.266 \Omega = 3 + 1 \parallel (-j0.288)$$

$$V_{TH} = \frac{10(-j0.288)}{1 - j0.288} = 2.77 \angle -73.93^\circ \text{ V}$$

$$V_L = \frac{V_{TH}(j2.13)}{3.08 + j1.86} = \underline{\underline{1.64 \angle -15.06^\circ \text{ V}}}$$

$$V_{L_{RMS}} = 1.16 V_{RMS} \angle -15.06^\circ$$

#4



$$\omega = 2\pi f = 3142 \text{ rad/s}$$

$$I_s = \frac{V_s}{z_{eq}}$$

$$S = V_s I_s^* = V_s \left(\frac{V_s}{z_{eq}} \right)^*$$

$$= \frac{V_s V_s^*}{z_{eq}^*} = \frac{|V_s|^2}{z_{eq}^*}$$

$$|V_s| = 5$$

$$z_{eq} = -j96.46 + \frac{(100)(330 + j314)}{100 + 330 + j314}$$

$$= 80.28 - j82.06 = 114.8 \angle -45.63^\circ$$

$$z_{eq}^* = 114.8 \angle 45.63^\circ$$

$$S = \frac{25}{114.8 \angle 45.63^\circ} = 0.218 \angle -45.63^\circ \text{ VA}$$

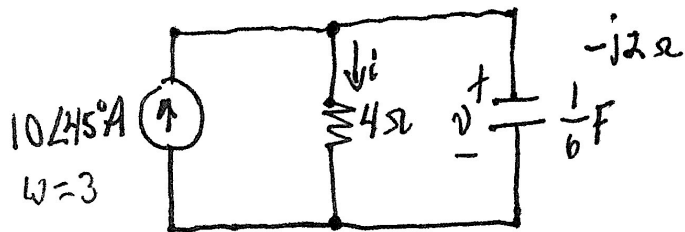
$$= (0.152 - j0.156) \text{ VA}$$

(W) (VAR)

#5 9.31

$$\frac{1}{j\omega C} = \frac{1}{j(3)(\frac{1}{6})} = -j2$$

a)

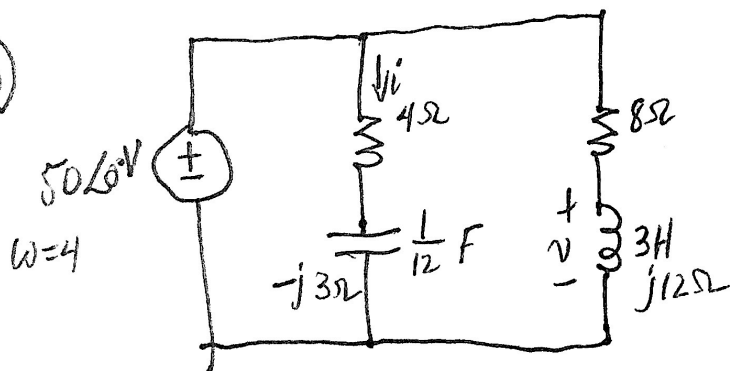


$$i = \frac{(10 \angle 45^\circ)(-j2)}{4 - j2} = 4.47 \angle -18.43^\circ \text{ A}$$

$$i(t) = 4.47 \cos(3t - 18.43^\circ) \text{ A}$$

$$v(t) = i(t)(4) = 17.89 \cos(3t - 18.43^\circ) \text{ V}$$

b)



$$\frac{1}{j\omega C} = \frac{1}{j(4)(\frac{1}{12})} = -j3 \quad j\omega L = j(4)(3) = j12$$

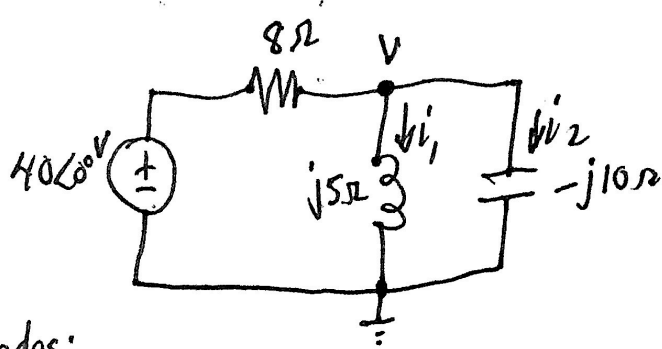
$$i = \frac{50}{4 - j3} = 10 \angle 36.87^\circ \text{ A}$$

$$i(t) = 10 \cos(4t + 36.87^\circ) \text{ A}$$

$$v = \frac{(50)(j12)}{8 + j12} = 41.60 \angle 33.69^\circ \text{ V}$$

$$v(t) = 41.60 \cos(4t + 33.69^\circ) \text{ V}$$

#6

9.32 $f = 60 \text{ Hz}$ 

nodos:

$$v: 0 = V \left(\frac{1}{j5} + \frac{1}{-j10} + \frac{1}{8} \right) - 40 \left(\frac{1}{8} \right)$$

$$V = \frac{5}{\frac{1}{8} + \frac{1}{j5} + \frac{1}{-j10}} = 31.23 \angle 38.66^\circ$$

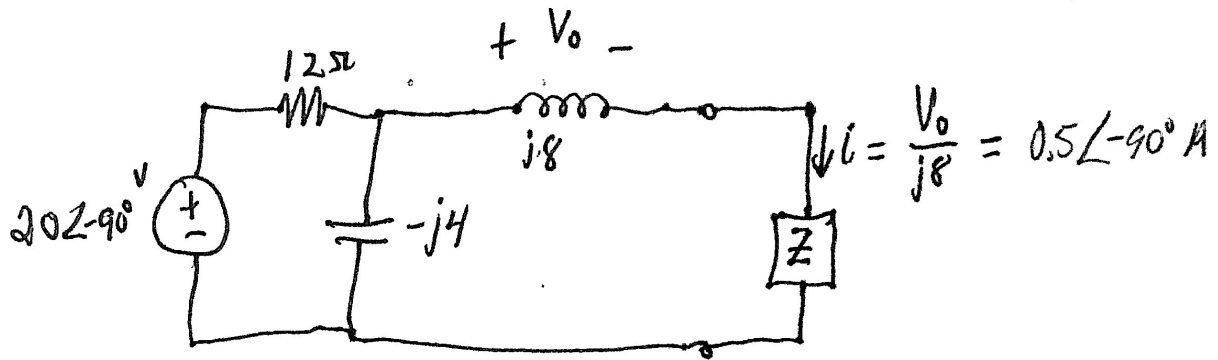
$$i_1 = \frac{V}{j5} = 6.25 \angle -51.34^\circ \quad i_2 = \frac{V}{-j10} = 3.12 \angle 128.66^\circ$$

$$\omega = 377 = 120\pi$$

$$i_1(t) = 6.25 \cos(377t - 51.34^\circ) \text{ A}$$

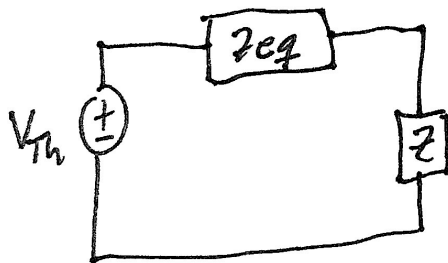
$$i_2(t) = 3.12 \cos(377t + 128.66^\circ) \text{ A}$$

#7



$$V_{Th} = \frac{(20\angle-90^\circ)(-j4)}{12-j4} = 6.32\angle-161.57^\circ \text{ V}$$

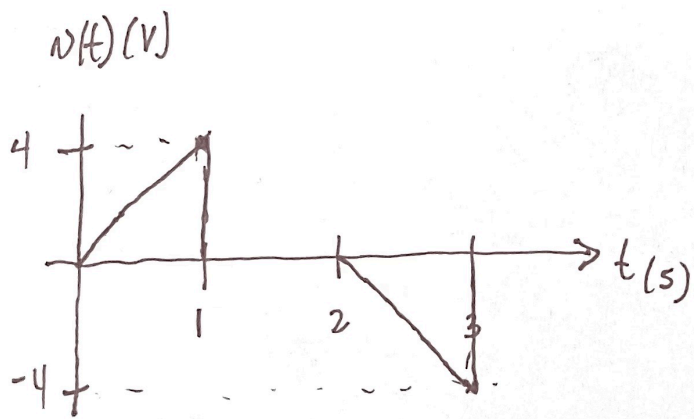
$$z_{eq} = j8 + 12 \parallel (-j4) = 4.56\angle74.74^\circ \Omega$$



$$i = \frac{V_{Th}}{Z + z_{eq}} \quad Z + z_{eq} = \frac{V_{Th}}{i} \quad Z = \frac{V_{Th}}{i} - z_{eq}$$

$$Z = \frac{6.32\angle-161.57^\circ}{0.5\angle-90^\circ} - 4.56\angle74.74^\circ$$

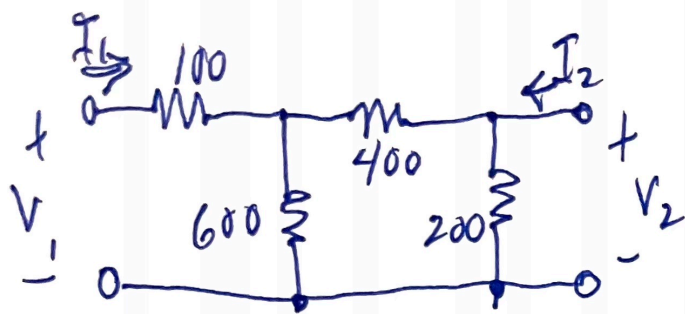
$$= 16.63\angle-80.31^\circ \Omega$$



$$\text{RMS} = \sqrt{\frac{2}{3} \int_0^1 (4t)^2 dt} = \sqrt{\frac{32}{3} \int_0^1 t^2 dt}$$

$$= \sqrt{\frac{32}{3} \left[\frac{1}{3} t^3 \right]_0^1} = \sqrt{\frac{32}{9}} = 1.88 \text{ V}$$

9.



$$V_1 = z_{11} I_1 + z_{12} I_2$$

$$V_2 = z_{21} I_1 + z_{22} I_2$$

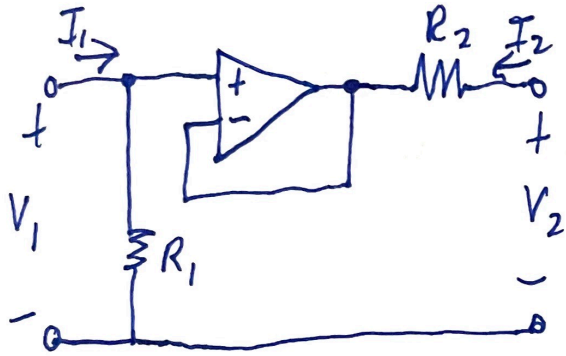
$$z_{11} = \frac{V_1}{I_1} \Big|_{I_2=0} = 100 + 600 \parallel 600 = 400 \Omega$$

$$z_{12} = \frac{V_1}{I_2} \Big|_{I_1=0} = \frac{V_{600}}{I_2} = \frac{600 I_2 \frac{200}{1000+200}}{I_2} = 100 \Omega$$

$$z_{21} = \frac{V_2}{I_1} \Big|_{I_2=0} = \frac{V_{200}}{I_1} = \frac{200 I_1 \frac{600}{600+600}}{I_1} = 100 \Omega$$

$$z_{22} = \frac{V_2}{I_2} \Big|_{I_1=0} = 200 \parallel 1000 = 167 \Omega$$

10.



$$V_1 = h_{11} I_1 + h_{12} V_2$$

$$I_2 = h_{21} I_1 + h_{22} V_2$$

$$h_{11} = \left. \frac{V_1}{I_1} \right|_{V_2=0} = R_1 \quad h_{12} = \left. \frac{V_1}{V_2} \right|_{I_1=0} = 0$$

$$h_{21} = \left. \frac{I_2}{I_1} \right|_{V_2=0} = \frac{-V_1/R_2}{V_1/R_1} = -\frac{R_1}{R_2}$$

$$h_{22} = \left. \frac{I_2}{V_2} \right|_{I_1=0} = \frac{1}{R_2}$$