Problem

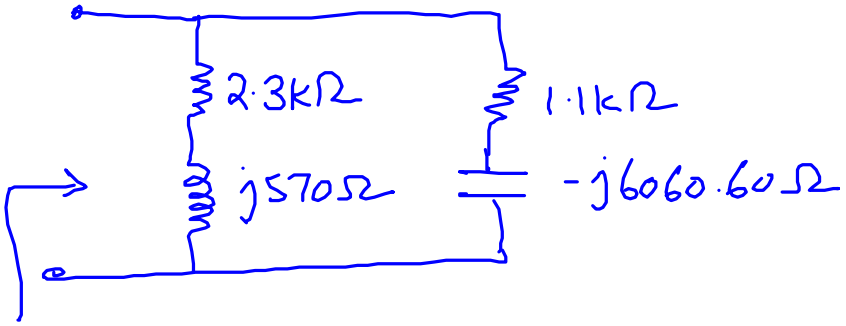
$\omega = 3000$ rad/sec

$j\omega L = j\,3\times10^{3}\times190\times10^{-3}\,\Omega$

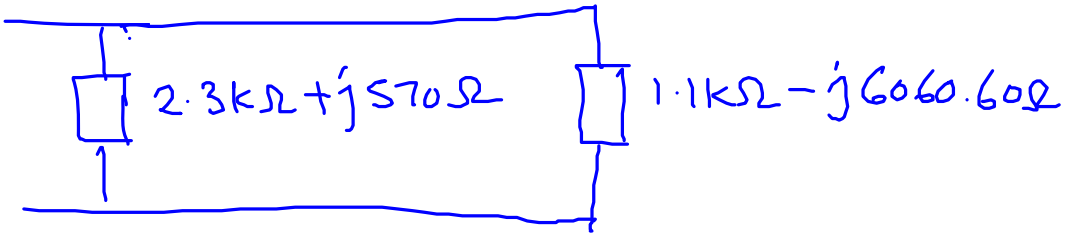
$= j570\,\Omega$

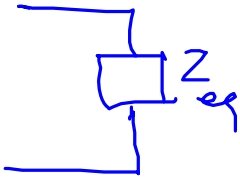
$\frac{1}{j\omega C} = \frac{1}{j\times3\times10^{3}\times55\times10^{-9}\,F}$

$= \frac{-j}{165\times10^{6}}\,\Omega = -j6060.60\,\Omega$

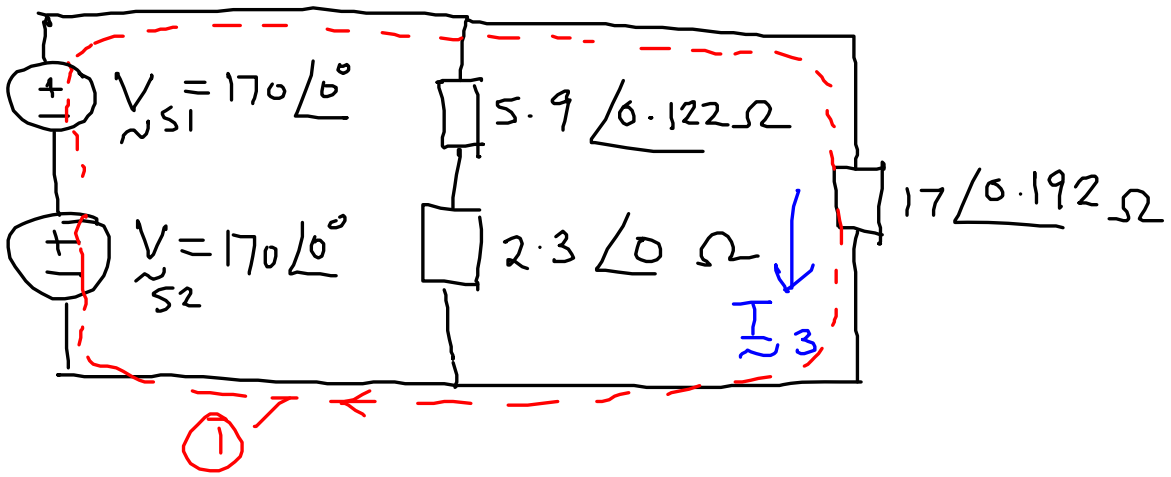


$\equiv$



$\equiv$  $\frac{1}{Z_{eq}} = \frac{1}{2.3k\Omega + j570\Omega} + \frac{1}{1.1k\Omega - j6060.60\Omega}$

Problem

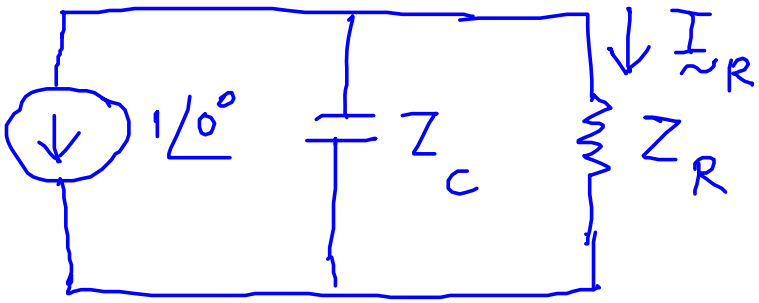


Loop ①:

$$\underset{\sim}{I}_3\, 17\angle 0.192 - 170\angle 0^\circ - 170\angle 0^\circ = 0$$

$$\underset{\sim}{I}_3 = \frac{340\angle 0^\circ}{17\angle 0.192}$$

Problem



$$Z_C = \frac{1}{j(200\pi)\,100\times10^{-6}}\ \Omega$$

(ω)

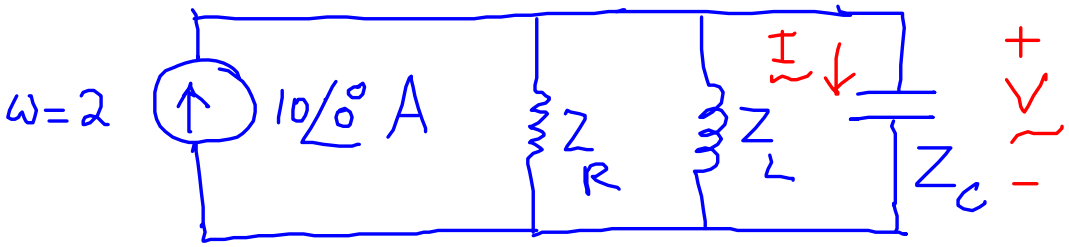
$$Z_R = 100\,\Omega$$

current division

$$\underset{\sim}{I}_R = \frac{\frac{1}{Z_R}}{\frac{1}{Z_C}+\frac{1}{Z_R}}\left(-1\angle 0^\circ\right)$$

Problem

In phasor land.



$Z_R = 3\Omega \qquad Z_L = j(2)3 \qquad Z_C = \dfrac{-j}{(2)\left(\frac{1}{3}\right)}$

(ω, L) (ω, C)

current division:

$$\underset{\sim}{I} = \frac{\frac{1}{Z_C}}{\frac{1}{Z_R} + \frac{1}{Z_L} + \frac{1}{Z_C}} 10\angle 0^\circ$$

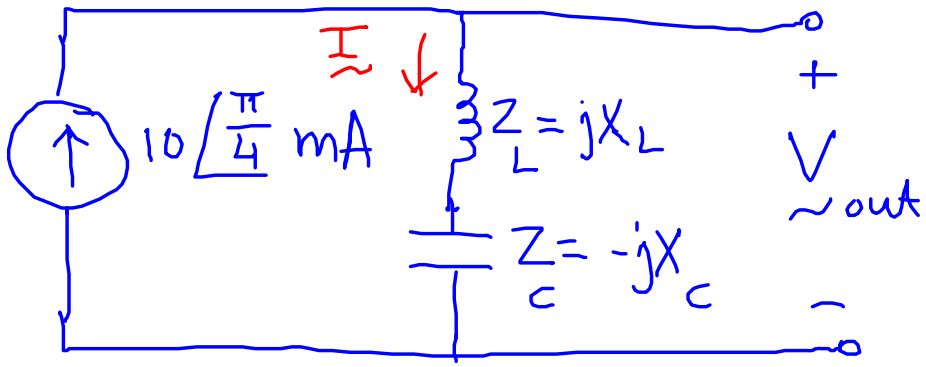
$$\underset{\sim}{V} = Z_C \underset{\sim}{I}$$

↓ real domain

$$v(t) = \mathrm{Re}\left[\underset{\sim}{V} e^{j2t}\right]$$

(ω)

Problem



$$\tilde{I} = 10\angle\frac{\pi}{4}$$

$$\tilde{V}_{out} = \tilde{I}(Z_L + Z_C)$$

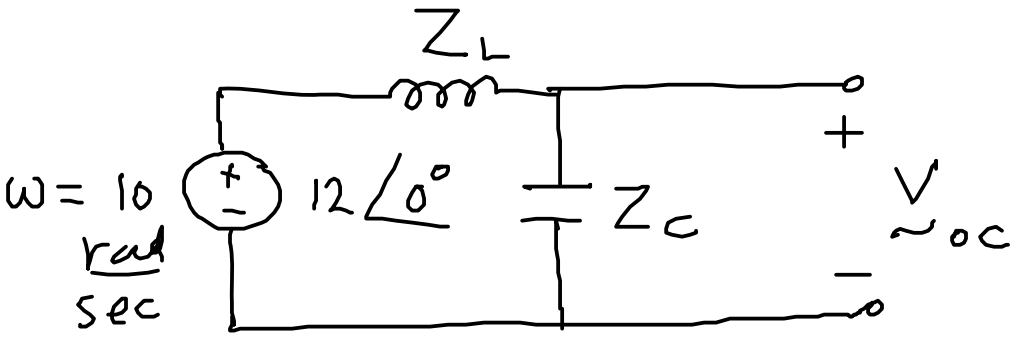
$$= 10\angle\frac{\pi}{4} \times 10^{-3}\,A\,(j1k\Omega - j10k\Omega)$$

$$= 10^{-2}\angle\frac{\pi}{4}\,(-9j\times 10^{3}) \qquad -j = \angle -\frac{\pi}{2}$$

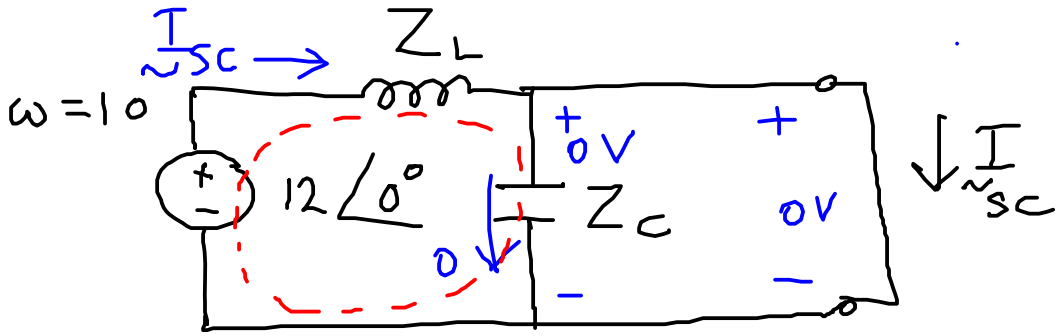
$$= 10\angle\frac{\pi}{4}\,9\angle -\frac{\pi}{2}\ V$$

$$\tilde{V}_{out} = 90\angle -\frac{\pi}{4}\ V$$

Problem



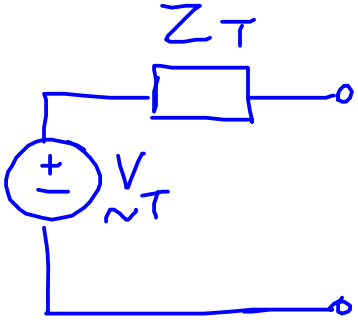
$$V_{oc} = \frac{Z_C}{Z_L + Z_C} 12\angle 0^\circ$$



$$-12\angle 0^\circ V + Z_L I_{sc} + 0 = 0$$

$$I_{sc} = \frac{12\angle 0^\circ V}{j\omega L}$$

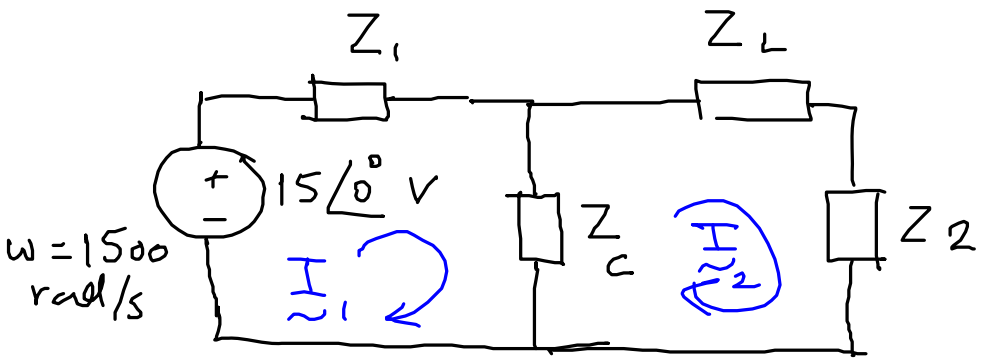
ω = 10 rad/sec, L = 0.1 H



$$V_T = V_{oc}$$

$$Z_T = V_{oc} / I_{sc}$$

Problem



$$Z_1 = 75\Omega \quad Z_2 = 100\Omega \quad Z_C = \frac{1}{j(1500)(10^{-6})}\Omega$$

$$Z_L = j(1500)0.5\,H$$

① $-15\angle 0^\circ + Z_1 I_1 + Z_C(I_1 - I_2) = 0$

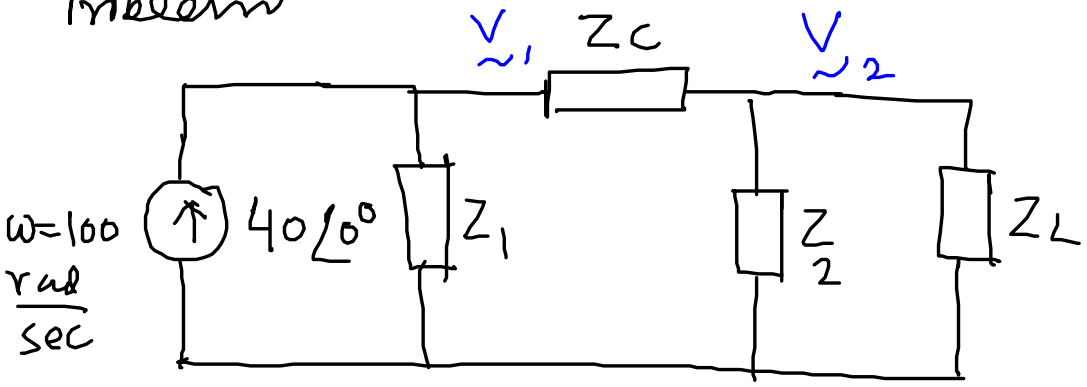
② $Z_C(I_2 - I_1) + Z_L I_2 + Z_2 I_2 = 0$

determine I_1 & I_2

$$i_1(t) = Re\left[I_1 e^{j\omega t}\right]$$

$$i_2(t) = Re\left[I_2 e^{j\omega t}\right]$$

Problem



$$Z_1 = 40\,\Omega \qquad Z_2 = 16\,\Omega \qquad Z_L = j(100)0.2\,\Omega$$

$$Z_C = \frac{-j}{(100)500\times10^{-6}}\,\Omega$$

1 $$40\angle 0^\circ + \frac{0-\tilde{V}_1}{Z_1} + \frac{\tilde{V}_2-\tilde{V}_1}{Z_C} = 0$$

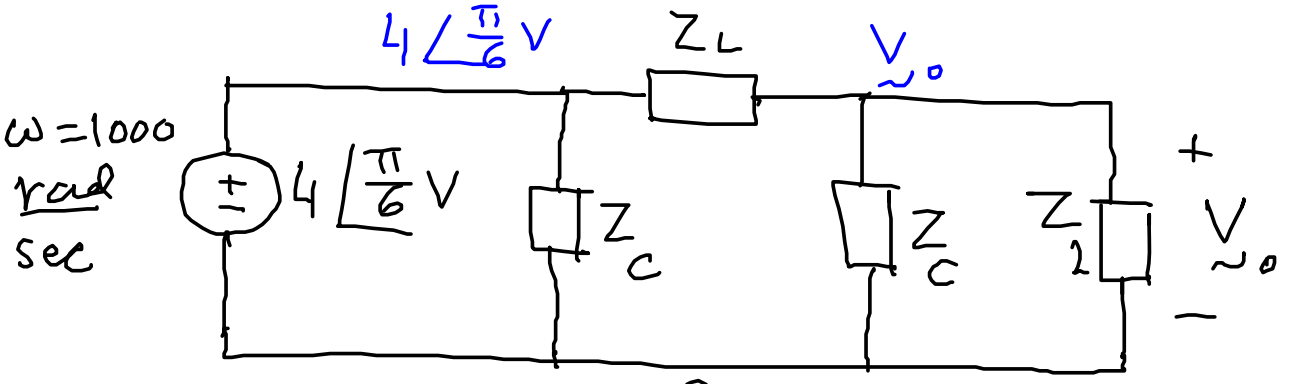
2 $$\frac{\tilde{V}_1-\tilde{V}_2}{Z_C} + \frac{0-\tilde{V}_2}{Z_2} + \frac{0-\tilde{V}_2}{Z_L} = 0$$

determine $\tilde{V}_1$ & $\tilde{V}_2$

$$v_1(t) = Re\left[\tilde{V}_1 e^{j\omega t}\right]$$

$$v_2(t) = Re\left[\tilde{V}_2 e^{j\omega t}\right]$$

Problem



$$Z_L = j(1000)60\times10^{-3}\ \Omega \qquad Z_2 = 120\Omega$$

$$Z_C = \frac{-j}{(1000)\,12.5\times10^{-6}}\ \Omega$$

node analysis

$$\frac{4\angle\frac{\pi}{6}\text{ V} - V_o}{Z_L} + \frac{0 - V_o}{Z_C} + \frac{0 - V_o}{Z_2} = 0$$

Determine V_o

$$v_o(t) = Re\left[V_o e^{j\omega t}\right]$$

(ω = 1000 rad/sec)