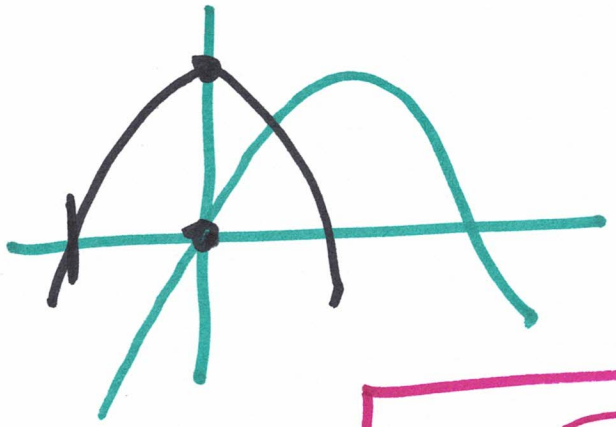
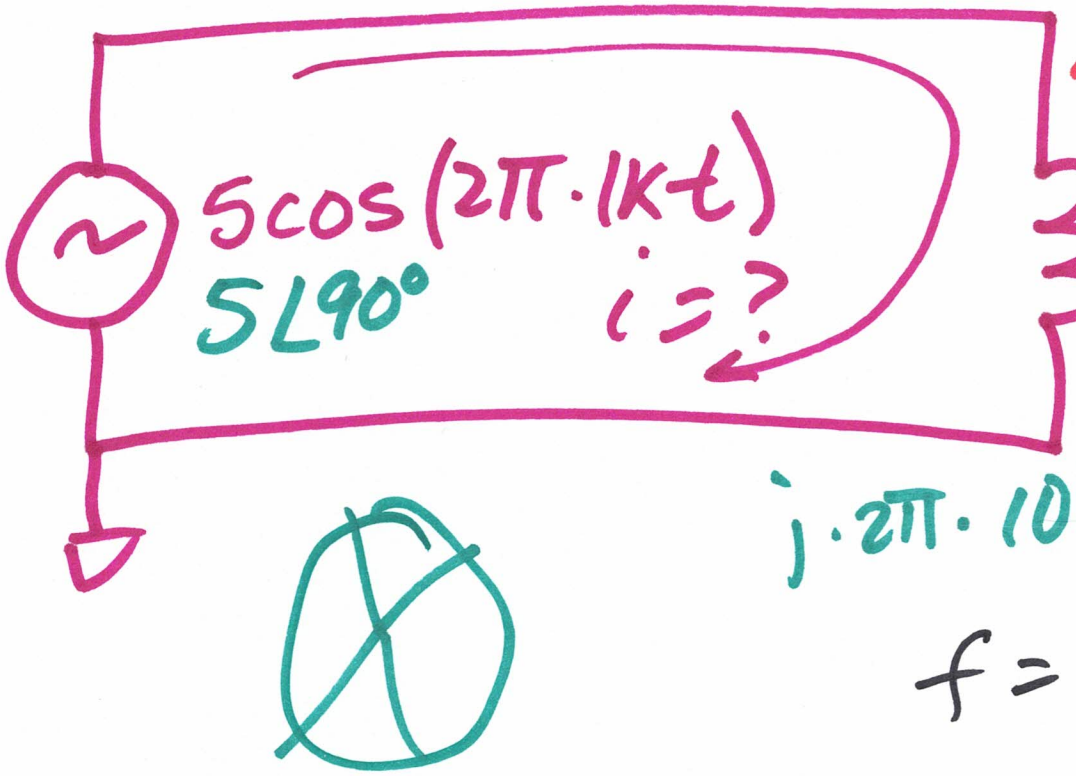
EE 221 Circuits II

Feb. 12, 2020

Lecture 7





$j \cdot 2\pi \cdot 10^{3} \cdot 10^{-3} = j6.28$

$f = 1\,KHz, \; T = 1ms$

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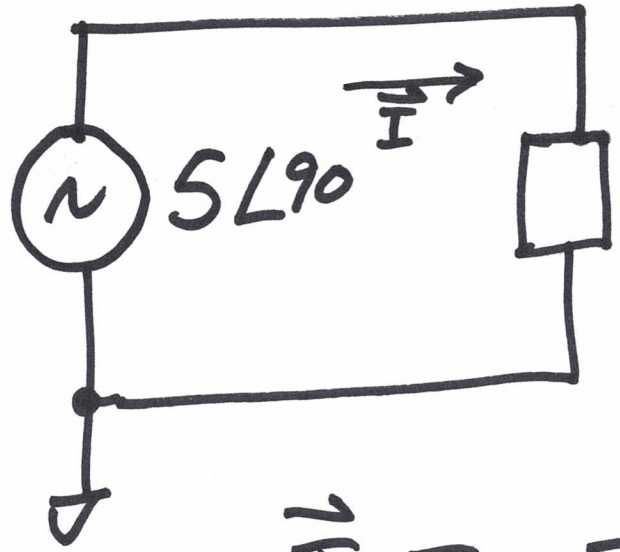
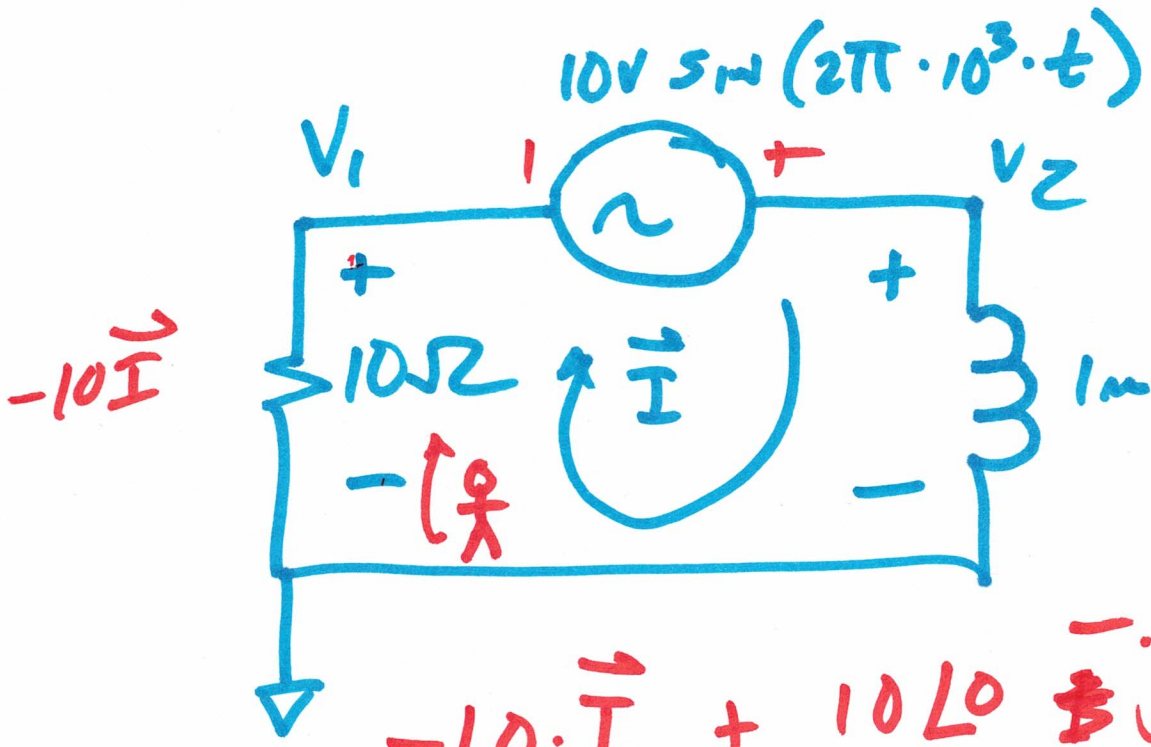


$$\vec{I} = \frac{5\angle 90}{6.28\angle 90} = 796\,mA\angle 0^{\circ}$$

$$i(t) = 796\,mA\,\sin(2\pi \cdot 1KHz \cdot t)$$



$$-10\cdot\vec{I} + 10\angle 0 - j6.28\vec{I} = 0$$

$$\vec{I}(-10 - j6.28) + 10\angle 0 = 0$$

$$10\angle 0 = \vec{I}(10 + j6.28)$$

$$10\angle 0 = \vec{I}\cdot 11.8\angle 32.1^\circ$$

$$\vec{I} = \frac{10}{11.8}\angle -32.1^\circ$$

$$\vec{I} = .85\angle -32.1^\circ$$

$i(t) =$

$.850\,mA\ SIN(2\pi\cdot 10^3\cdot t - 32^\circ)$

$\frac{32}{360}\cdot 1\,ms$

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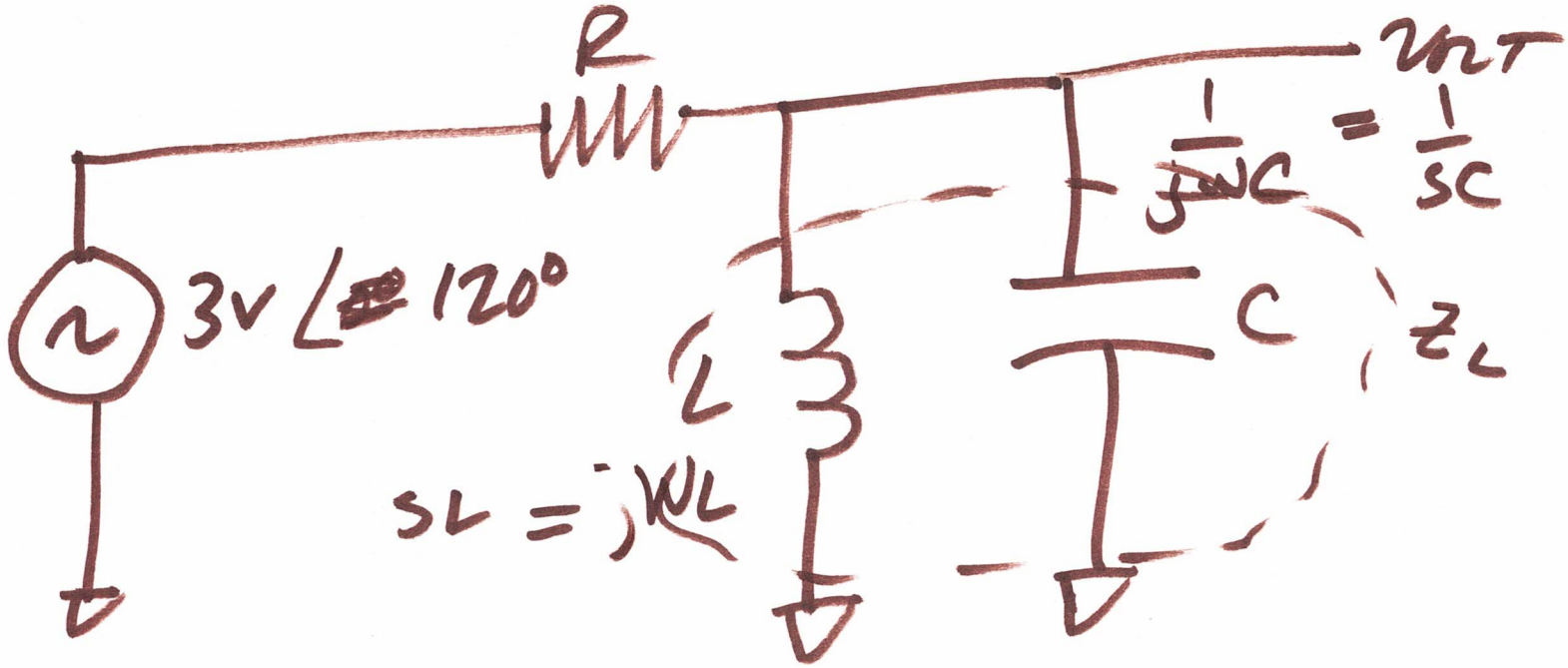


$$V_{out} = 3\angle 120 \cdot \frac{Z_L}{Z_L + R}$$

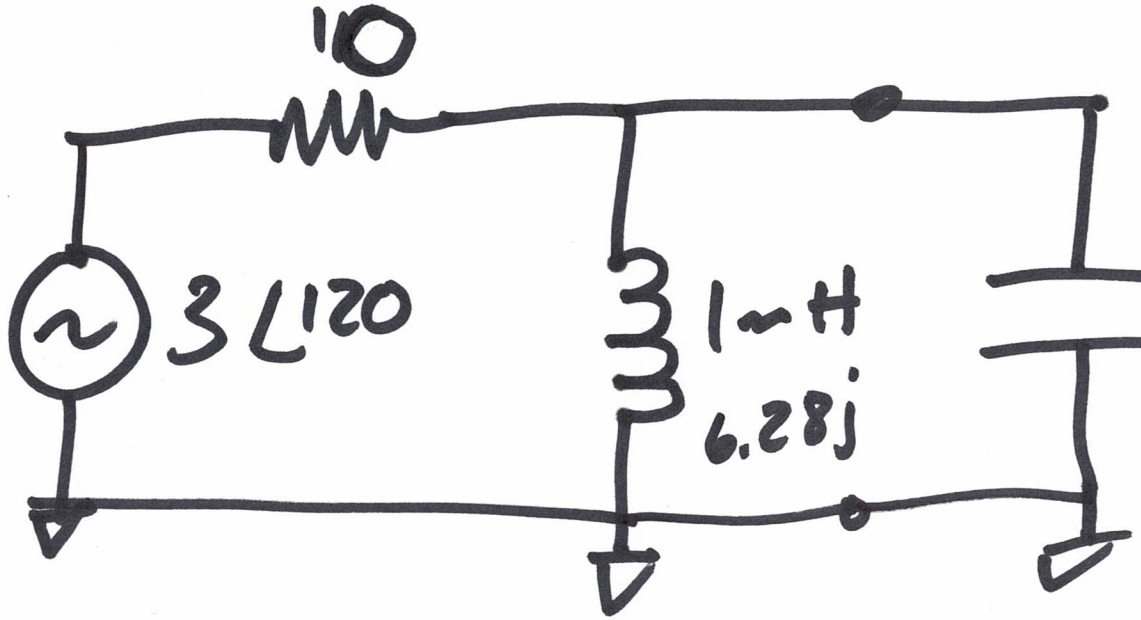
$$Z_L = \frac{sL \cdot \frac{1}{sC}}{sL + \frac{1}{sC}} = \frac{sL}{1 + s^2LC}$$

$$V_{RT} = 3\angle 120 \cdot \frac{\frac{SL}{1+s^2LC}}{\frac{SL}{1+s^2LC} + R + j\omega L}$$

$$= \frac{3\angle 120 \cdot SL}{SL + R + s^2LCR}$$

$$s_{1,2} = \frac{-L \pm \sqrt{L^2 - 4 \cdot LCR \cdot R}}{2 \cdot LCR}$$

$$= \frac{3\angle 120 \cdot \omega L \angle 90}{(s + s_1)(s - s_2)}$$



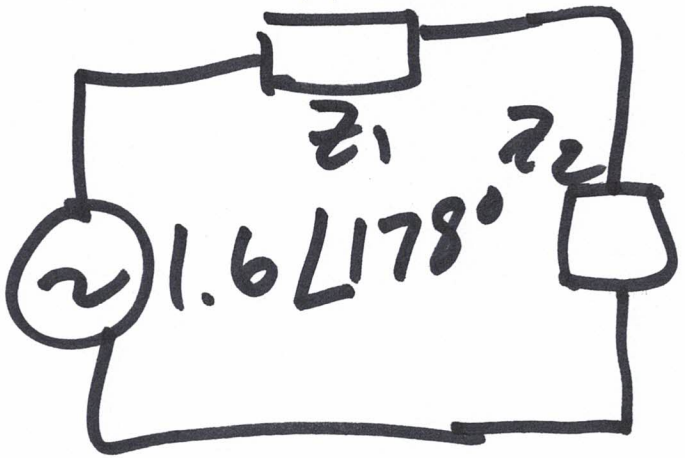
$$\frac{1}{j6.28 \cdot 10^{-3} \cdot 10^{-6}} = -j79.6$$

$6.28\angle 90$

$$V_{oc} = V_{TH} = \frac{3\angle 120 \cdot 6.28j}{10 + j6.28} = \frac{18.84\angle 210}{11.8\angle 32^\circ}$$

$10 \| j6.28$

$$V_{TH} = 1.6\angle 178^\circ$$



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$$v_{\pi T} = 1.6\angle 178 \cdot \frac{Z_2}{Z_1 + Z_2}$$

$62.8\angle 90$

$$Z_2 = 10 \| j6.28$$

$$= \frac{10 \cdot j6.28}{10 + j6.28} = \frac{j62.8}{M\angle\theta}$$