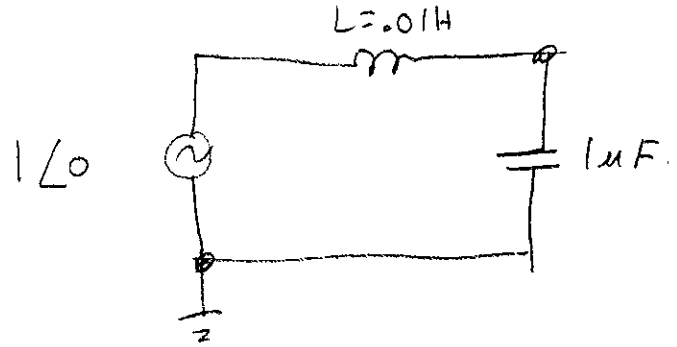
Solving it for one frequency ...

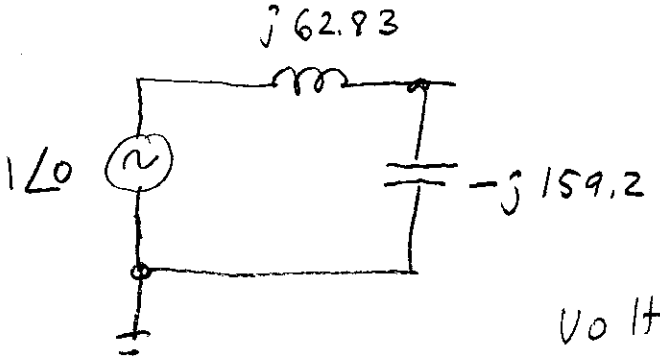


Try $f = 10^3 \Rightarrow \omega = 2\pi f = 2\pi 1000 = 6283$

Substitute $\mathcal{Z}$ =

$$\mathcal{Z}_L = sL = j\omega L = j(2\pi)(1000)(.01)$$
$$= j2\pi 10$$
$$= j62.83$$

$$\mathcal{Z}_C = \frac{1}{sC} = \frac{1}{j\omega C} = \frac{1}{j(2\pi)(1000)(10^{-6})}$$
$$= \frac{1}{j2\pi 10^{-3}}$$
$$= \frac{1}{j\,6.283\times10^{-3}}$$
$$= -j159.2$$



Voltage divider ...

$$V_{out} = \frac{-j159.2}{j62.83 - j159.2}$$

$$= \frac{-j159.2}{-j96.32} = \boxed{1.653}\angle 0^\circ$$

Output is bigger than input ??????? $= 1.653 + j0$

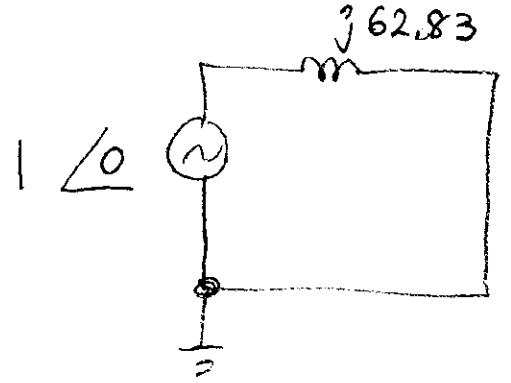
Thevenin and Norton equivalent circuits -

Same way --- Find open circuit voltage
Short circuit current

Find $Z = \frac{V_{oc}}{I_{sc}}$

This example: $V_{oc} = 1.653$

Short circuit current ---

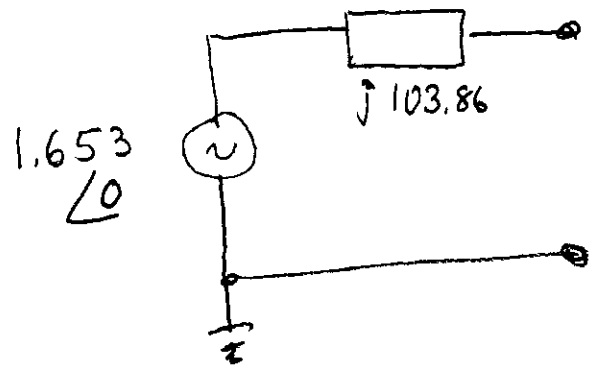


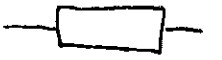
$$I_{sc} = \frac{V}{Z} = \frac{1}{j\,62.83}$$

$$= -j.0159$$

$$Z = \frac{V_{oc}}{I_{sc}} = \frac{1.653}{-j.0159} = j\ 103.86\ \Omega$$

Thevenin:



What is  ?

L or C?

$+j \Rightarrow L$

$-j \Rightarrow C$

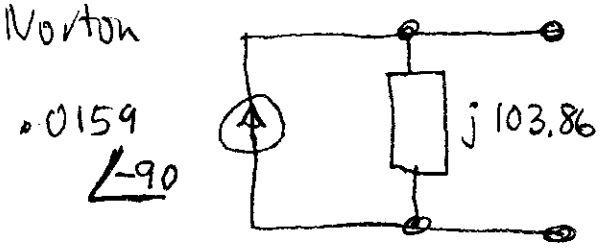
$Z_L = j\omega L$

$L = \frac{Z_L}{j\omega}$

$L = \frac{j\,103.86}{j\,6283}$

$= .016.53$ H.

Norton

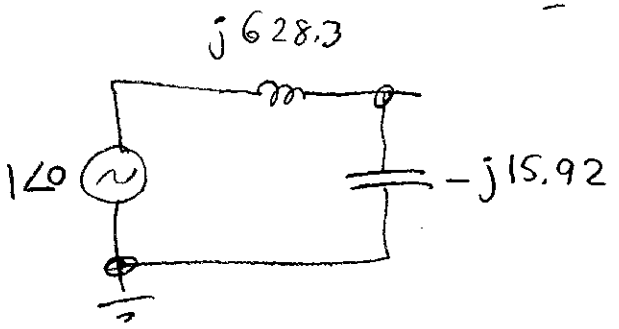


Try another frequency --- (10 x the previous one)

$f = 10^4 \qquad \omega = 2\pi f = 2\pi\, 10000 = 62831$

$$Z_L = sL = j\omega L = j(62831)(.01)$$
$$= j\,628.3 \quad \leftarrow \ 10\times$$

$$Z_C = \frac{1}{sC} = \frac{1}{j\omega C} = \frac{1}{j(62831)(10^{-6})}$$
$$= \frac{1}{j\,6.283\times 10^{-2}}$$
$$= -j\,15.92 \quad \leftarrow \ \frac{1}{10}\times$$



$$V_{out} = \frac{-j\,15.92}{j\,628.3 - j\,15.92}$$

$$= \frac{-j\,15.92}{j\,612.38} = -.026$$

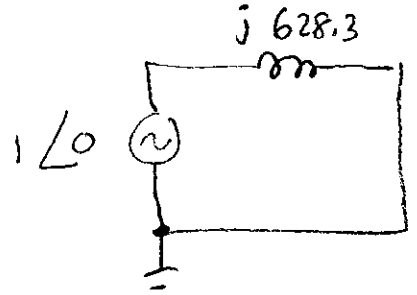
$$= .026\angle 180^\circ$$

phase inverted ?????? $= -.026 + j0$

Thevenin and Norton equivalents

$$V_{OC} = -.026$$

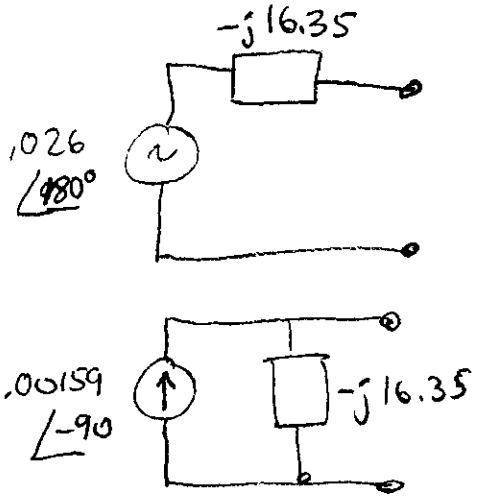
Short circuit current:



$$I_{sc} = \frac{V}{Z} = \frac{1}{j628.3}$$

$$= -j.00159$$

$$Z = \frac{V_{oc}}{I_{sc}} = \frac{-.026}{-j.00159} = -j16.35\ \Omega$$



$$Z_C = \frac{1}{j\omega C}$$

$$C = \frac{1}{j\omega Z_C}$$

$$= \frac{1}{j(62831)(-j16.35)}$$

$$= \frac{1}{-j^2(1.027 \times 10^6}$$

$$= 973.4\ nf.$$

$$= .973\ \mu f$$