# Thevenin + Norton Equivalents

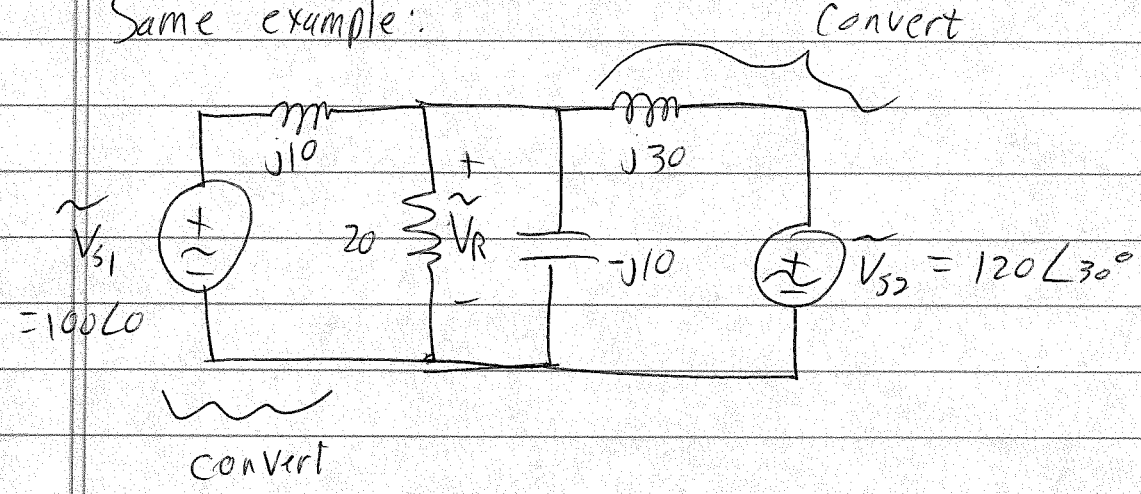
Same as before, using Phasors:

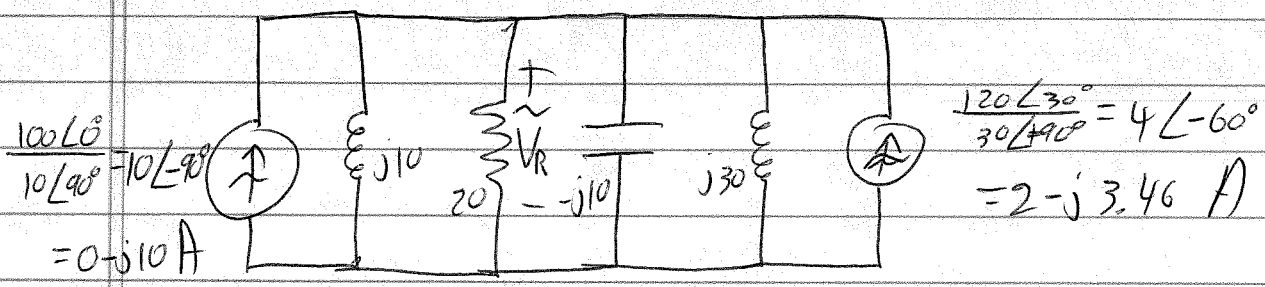
$$\tilde{V}_{oc} = \tilde{Z}_T \tilde{I}_{sc} = \tilde{V}_T$$

$$\tilde{I}_{sc} = \frac{\tilde{V}_{oc}}{\tilde{Z}_T} = \tilde{I}_N$$

$$\tilde{Z}_T = \frac{\tilde{V}_{oc}}{\tilde{I}_{sc}}$$

Same example:




Need voltage across whole thing:

$$\tilde{V}_R = \tilde{Z}_{eq} \tilde{I}_T$$

$$\tilde{I}_T = 0 - j10\,A + 2 - j3.46\,A = 2 - j13.46\,A = 13.61\angle -81.55^\circ$$

$$\tilde{Z}_{eq} = \frac{1}{\frac{1}{j10} + \frac{1}{20} + \frac{1}{j10} + \frac{1}{j30}} = \frac{1}{\frac{1}{20} + \frac{1}{j30}}$$

$$= \frac{1}{\frac{1}{20} + \frac{1}{j30}} = \frac{1}{\frac{j3+2}{j60}} = \frac{j60}{2+j3} = \frac{60\angle 90^\circ}{3.606\angle 56.31^\circ}$$

$$= 16.64\angle 33.69^\circ$$

So $\tilde{V}_R = \tilde{Z}_{eq}\tilde{I}_T = (16.64\angle 33.69^\circ)(13.61\angle -81.55^\circ)$

$\tilde{V}_R = 226\angle -47.86^\circ$ as before