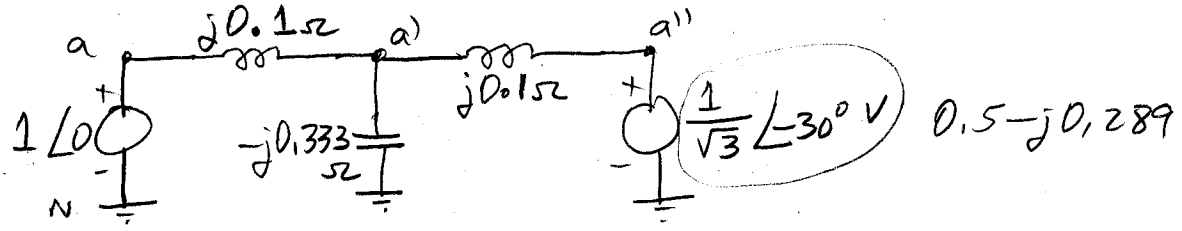
2.11 Balanced → use one-line with line-to-neutral voltages

$$Z_{c_Y} = \frac{Z_{c_\Delta}}{3} = \frac{-j1}{3} = -j0.333\ \Omega$$

$V_{a''b''} = 1\angle 0$, so $V_{A''N} = \frac{1}{\sqrt{3}}\angle -30°$



Use KCL at a'

$$\frac{V_{a'N} - 1\angle 0}{j0.1} + \frac{V_{a'N}}{-j0.333} + \frac{V_{a'N} - \frac{1}{\sqrt{3}}\angle -30°}{j0.1} = 0$$

$$V_{a'N}\left[\frac{1}{j0.1} + \frac{1}{-j0.333} + \frac{1}{j0.1}\right] = \frac{1\angle 0}{j0.1} + \frac{\frac{1}{\sqrt{3}}\angle -30°}{j0.1}$$

$$V_{a'N}[-j10 + j3.0 - j10] = \underbrace{10\angle -90°}_{-j10} + \underbrace{5.77\angle -120°}_{-2.89 - j5.00}$$

$$\hat{V}_{a'N}[-j17] = -2.89 - j15 = 15.28\angle -100.9$$

$$\tilde{V}_{a'N} = \frac{15.28\angle -100.9}{17\angle -90} = 0.899\angle -10.9°\ V$$

$0.883 - j0.170$

So $\tilde{V}_{b'N} = \tilde{V}_{a'N}\angle -120 = 0.899\angle -130.9°\ V$

$\tilde{V}_{c'N} = V_{a'N}\angle +120 = 0.899\angle 109.1°\ V$

$V_{a'b'} = V_{a'N}\sqrt{3}\angle 30° = 1.557\angle 19.1°\ V$

Check KCL with the arithmetic

$-1.70 + j1.17$ ← • → $1.19 - j3.83$

↓ $0.511 + j2.65$

OK

$\Sigma = 0$