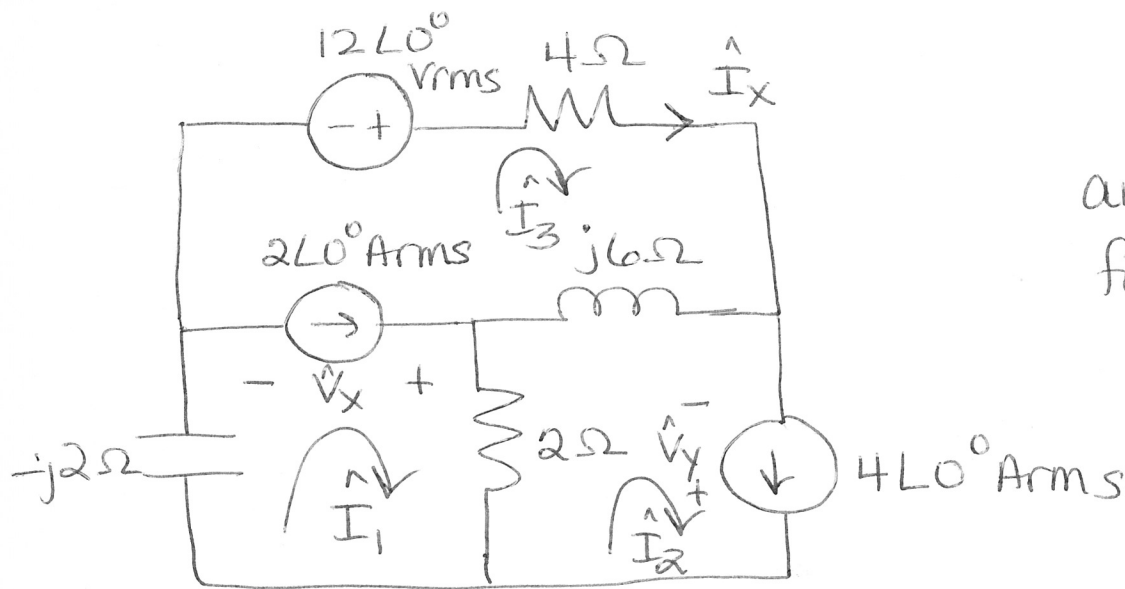




Find $\hat{I}_x$
and $P \& Q$
for each
element.

Know
 $\hat{I}_2 = 4\angle 0^\circ \text{ Arms}$
 $\hat{I}_1 - \hat{I}_3 = 2\angle 0^\circ$

$$m1: \hat{V}_x - 2(\hat{I}_1 - \hat{I}_2) - (-j2)\hat{I}_1 = 0$$

$$m2: -2(\hat{I}_2 - \hat{I}_1) - j6(\hat{I}_2 - \hat{I}_3) + \hat{V}_y = 0$$

$$m3: 12\angle 0^\circ - 4\hat{I}_3 - j6(\hat{I}_3 - \hat{I}_2) - \hat{V}_x = 0$$

simplify

$$\hat{I}_1(-2 + j2) + \hat{I}_2(2) + \hat{V}_x = 0$$

$$\ast \hat{I}_1(-2 + j2) + \hat{V}_x = 8\angle 180^\circ$$

$$\ast \hat{I}_1(2) + \hat{I}_3(j6) + \hat{V}_y = 25.30\angle 71.56^\circ$$

$$\ast \hat{I}_3(-4 - j6) - \hat{V}_x = 26.83\angle -116.56^\circ$$

$$\ast \hat{I}_1(1) + \hat{I}_3(-1) = 2\angle 0^\circ$$

$$\hat{I}_1 = 6.32\angle 18.44^\circ \text{ Arms}$$

$$\hat{I}_3 = 4.47\angle 26.57^\circ \text{ Arms}$$

$$\hat{V}_x = 11.31\angle -45^\circ \text{ Vrms}$$

$$\hat{V}_y = 8.95\angle -26.53^\circ \text{ Vrms}$$

$$\boxed{\begin{aligned} \hat{I}_x &= \hat{I}_3 \\ &= 4.47\angle 26.57^\circ \\ &\text{ Arms} \end{aligned}}$$

Pg 2

Note $P = \text{Re}[\hat{S}]$ $Q = \text{Im}[\hat{S}]$ 12 L0 Vrms

$$\hat{S} = (12 L0)(\hat{I}_3)^*$$

$$= 53.64 \angle -26.57^\circ \text{ VA, Del}$$

$$P = 47.97 \text{ W, Del}$$

$$Q = -23.99 \text{ VAR, Del}$$

4 L0° Arms

$$\hat{S} = \hat{V}_y (4 L0)^*$$

$$= 35.8 \angle -26.53^\circ \text{ VA, Del}$$

$$P = 32.03 \text{ W, Del}$$

$$Q = -16 \text{ VAR, Del}$$

2 Ω

$$P = |(\hat{I}_1 - \hat{I}_2)|^2 (2)$$

$$= (2.82)^2 (2)$$

$$= 15.96 \text{ W, Abs}$$

$$Q = 0$$

-j2 Ω

$$P = 0$$

$$Q = -2 (\hat{I}_1)^2$$

$$= -79.88 \text{ VAR, Abs}$$

checks
↗2 L0° Arms

$$\hat{S} = \hat{V}_x (2 L0)^*$$

$$= 22.62 \angle -45^\circ \text{ VA, Del}$$

$$P = 16.00 \text{ W, Del}$$

$$Q = -16.00 \text{ VAR, Del}$$

4 Ω

$$P = (\hat{I}_3)^2 (4)$$

$$= 79.92 \text{ W, Abs}$$

$$Q = 0$$

j6 Ω

$$P = 0$$

$$Q = 6 |(\hat{I}_2 - \hat{I}_3)|^2$$

$$= 23.99 \text{ VAR, Abs}$$

$$\sum P_{\text{del}} = 96 \text{ W}$$

$$\sum P_{\text{abs}} = 95.88 \text{ W}$$

$$\sum Q_{\text{del}} = -55.98 \text{ VAR}$$

$$\sum Q_{\text{abs}} = -55.90 \text{ VAR}$$