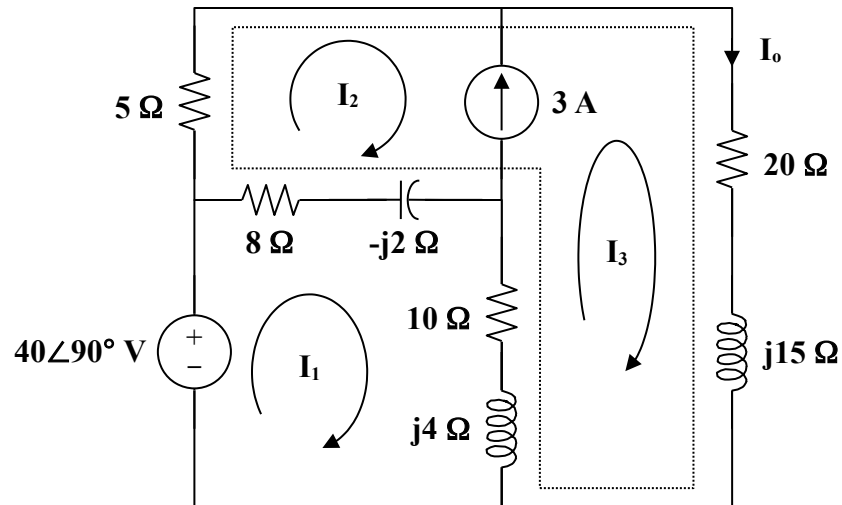


### Chapter 10, Solution 34.

The circuit is shown below.



For mesh 1,

$$-j40 + (18 + j2)\mathbf{I}_1 - (8 - j2)\mathbf{I}_2 - (10 + j4)\mathbf{I}_3 = 0 \quad (1)$$

For the supermesh,

$$(13 - j2)\mathbf{I}_2 + (30 + j19)\mathbf{I}_3 - (18 + j2)\mathbf{I}_1 = 0 \quad (2)$$

Also,

$$\mathbf{I}_2 = \mathbf{I}_3 - 3 \quad (3)$$

Adding (1) and (2) and incorporating (3),

$$-j40 + 5(\mathbf{I}_3 - 3) + (20 + j15)\mathbf{I}_3 = 0$$

$$\mathbf{I}_3 = \frac{3 + j8}{5 + j3} = 1.465 \angle 38.48^\circ$$

$$\mathbf{I}_0 = \mathbf{I}_3 = \mathbf{1.465 \angle 38.48^\circ A}$$