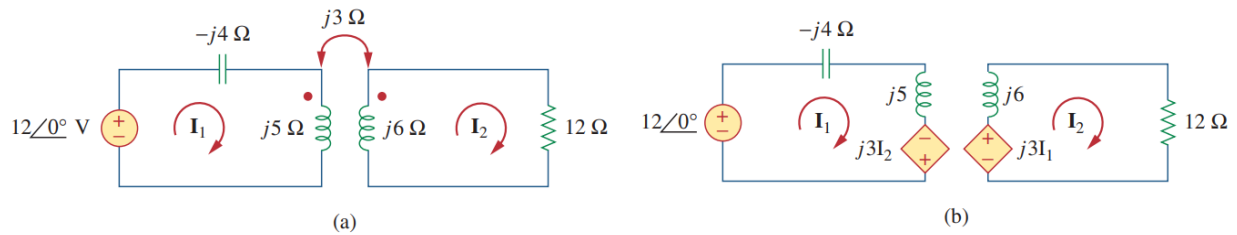


Calculate the phasor currents  $\mathbf{I}_1$  and  $\mathbf{I}_2$  in the circuit



### Solution:

For loop 1, KVL gives

$$-12 + (-j4 + j5)\mathbf{I}_1 - j3\mathbf{I}_2 = 0$$

or

$$j\mathbf{I}_1 - j3\mathbf{I}_2 = 12 \quad (13.1.1)$$

For loop 2, KVL gives

$$-j3\mathbf{I}_1 + (12 + j6)\mathbf{I}_2 = 0$$

or

$$\mathbf{I}_1 = \frac{(12 + j6)\mathbf{I}_2}{j3} = (2 - j4)\mathbf{I}_2 \quad (13.1.2)$$

Substituting this in Eq. (13.1.1), we get

$$(j2 + 4 - j3)\mathbf{I}_2 = (4 - j)\mathbf{I}_2 = 12$$

or

$$\mathbf{I}_2 = \frac{12}{4 - j} = 2.91\angle 14.04^\circ\text{ A} \quad (13.1.3)$$

From Eqs. (13.1.2) and (13.1.3),

$$\begin{aligned} \mathbf{I}_1 &= (2 - j4)\mathbf{I}_2 = (4.472\angle -63.43^\circ)(2.91\angle 14.04^\circ) \\ &= 13.01\angle -49.39^\circ\text{ A} \end{aligned}$$