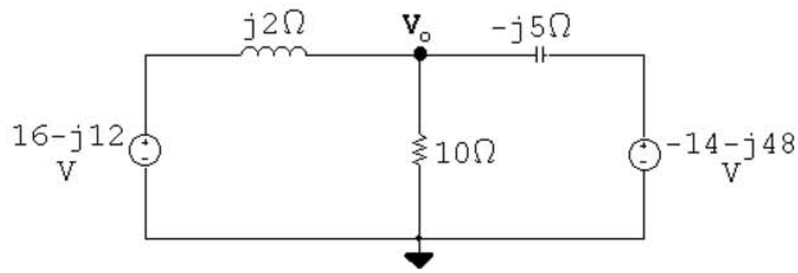
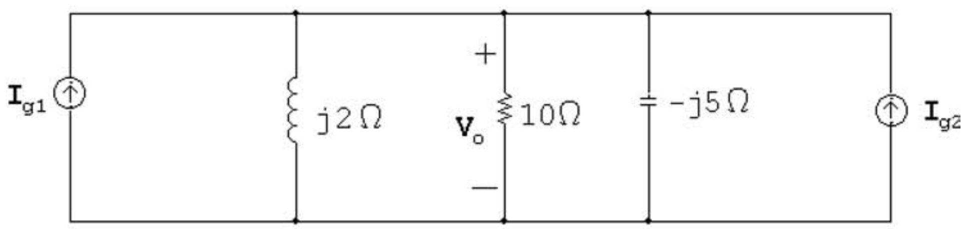
P 9.53 From the solution to Problem 9.52 the phasor-domain circuit is



Making two source transformations yields



$$\mathbf{I}_{g1} = \frac{16 - j12}{j2} = -6 - j8\,\text{A}$$

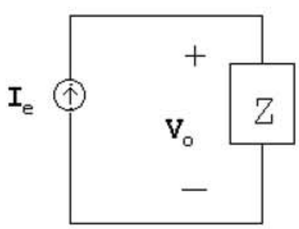
$$\mathbf{I}_{g2} = \frac{-14 - j48}{-j5} = 9.6 - j2.8\,\text{A}$$

$$Y = \frac{1}{j2} + \frac{1}{10} + \frac{1}{-j5} = (0.1 - j0.3)\,\text{S}$$

$$Z = \frac{1}{Y} = 1 + j3\,\Omega$$

$$\mathbf{I}_e = \mathbf{I}_{g1} + \mathbf{I}_{g2} = 3.6 - j10.8\,\text{A}$$

Hence the circuit reduces to



$$\mathbf{V}_o = Z\mathbf{I}_e = (1 + j3)(3.6 - j10.8) = 36\underline{/0^\circ}\,\text{V}$$

$$\therefore \quad v_o(t) = 36\cos 2000t\,\text{V}$$

P 9.56 Write a KCL equation at the top node:

$$\frac{\mathbf{V}_o}{-j8} + \frac{\mathbf{V}_o - 2.4\mathbf{I}_\Delta}{j4} + \frac{\mathbf{V}_o}{5} - (10 + j10) = 0$$

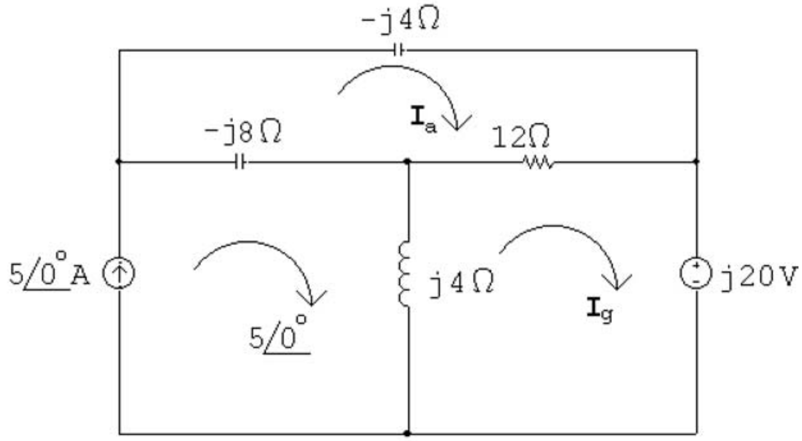
The constraint equation is:

$$\mathbf{I}_\Delta = \frac{\mathbf{V}_o}{-j8}$$

Solving,

$$\mathbf{V}_o = j80 = 80\underline{/90^\circ}\text{ V}$$

P 9.59



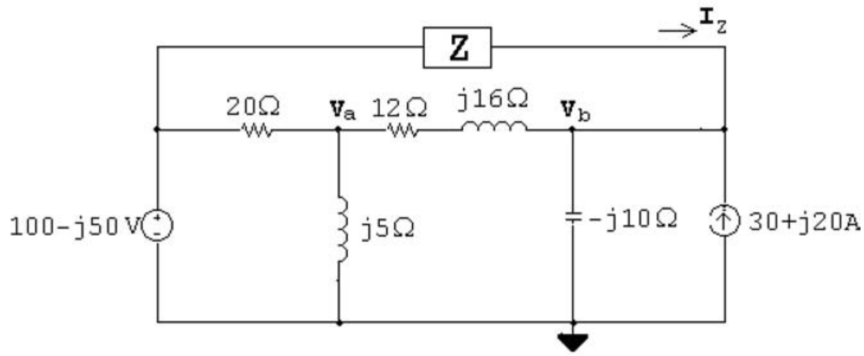
$$(12 - j12)\mathbf{I}_\mathrm{a} - 12\mathbf{I}_g - 5(-j8) = 0$$

$$-12\mathbf{I}_\mathrm{a} + (12 + j4)\mathbf{I}_g + j20 - 5(j4) = 0$$

Solving,

$$\mathbf{I}_g = 4 - j2 = 4.47\underline{/-26.57^\circ}\,\mathrm{A}$$

P 9.63



$$\frac{\mathbf{V}_a - (100 - j50)}{20} + \frac{\mathbf{V}_a}{j5} + \frac{\mathbf{V}_a - (140 + j30)}{12 + j16} = 0$$

Solving,

$$\mathbf{V}_a = 40 + j30\,\mathrm{V}$$

$$\mathbf{I}_Z + (30 + j20) - \frac{140 + j30}{-j10} + \frac{(40 + j30) - (140 + j30)}{12 + j16} = 0$$

Solving,

$$\mathbf{I}_Z = -30 - j10\,\mathrm{A}$$

$$Z = \frac{(100 - j50) - (140 + j30)}{-30 - j10} = 2 + j2\,\Omega$$