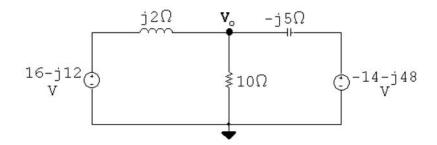
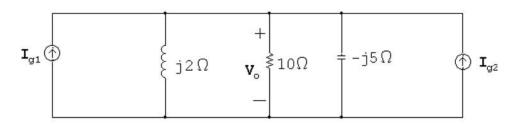
P 9.53 From the solution to Problem 9.52 the phasor-domain circuit is



Making two source transformations yields



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

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

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

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

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

Hence the circuit reduces to

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

$$v_o(t) = 36\cos 2000t \, V$$

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P 9.56 Write a KCL equation at the top node:

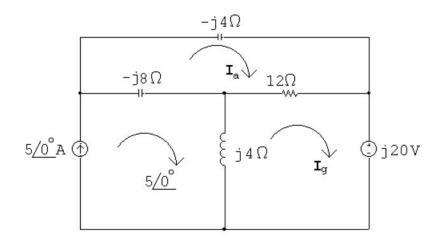
$$\frac{\mathbf{V}_o}{-j8} + \frac{\mathbf{V}_o - 2.4\mathbf{I}_{\Delta}}{j4} + \frac{\mathbf{V}_o}{5} - (10 + j10) = 0$$

The constraint equation is:

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

Solving,

$$V_o = j80 = 80/90^{\circ} \text{ V}$$

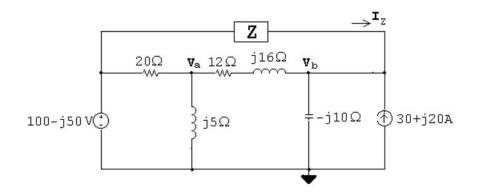


$$(12 - j12)\mathbf{I}_{a} - 12\mathbf{I}_{g} - 5(-j8) = 0$$

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

Solving,

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



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

Solving,

$$\mathbf{V}_{\mathbf{a}} = 40 + j30 \,\mathbf{V}$$

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

Solving,

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

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