Problem 8.29

Find Vo in the network in Figure P8.29

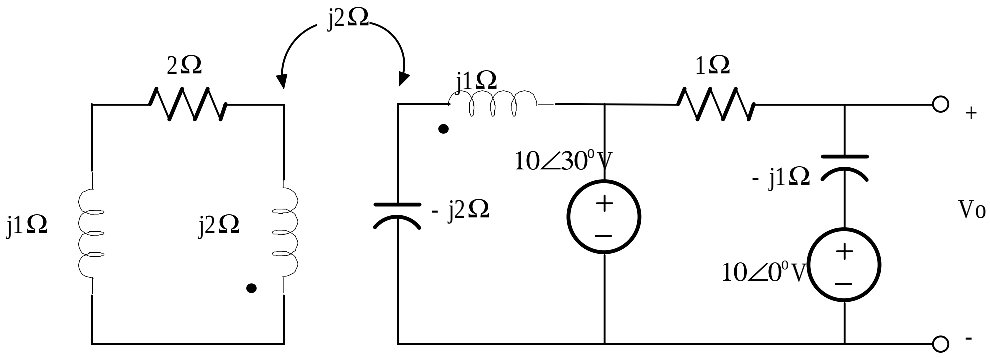
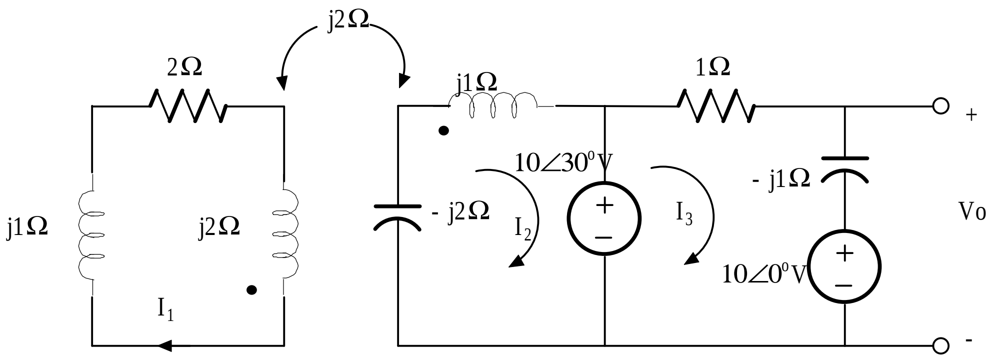


Figure P8.29

Suggested Solution



$0 = I_1\ (2 + j3) - j1\ I_2$ (1)

$-10\angle 30^o = -\ j1\ I_1 + I_2(-j1)$ (2)

$10\angle 30^o - 10\angle 0^o = I_3\ (1 - j1)$ (3)

$Vo = (-j1)I_3 + 10\angle 0^o$ (4)

From (3) and (4)

we see that

Vo is independent of I1 and I2 !

From (3), $I_3 = (10\angle 30^o - 10\angle 0^o) / ((\sqrt{2})\angle -45^o) = 3.66\angle 150^o$ A

From (4), $Vo = 3.66\angle 60^o - 10\angle 0^o$

$Vo = 8.76\angle 158.80^o V$

Problem 8.44

If L1 = L2 = 4H and k = 0.8, find i1(t) and I2(t) in the circuit in Figure P8.44

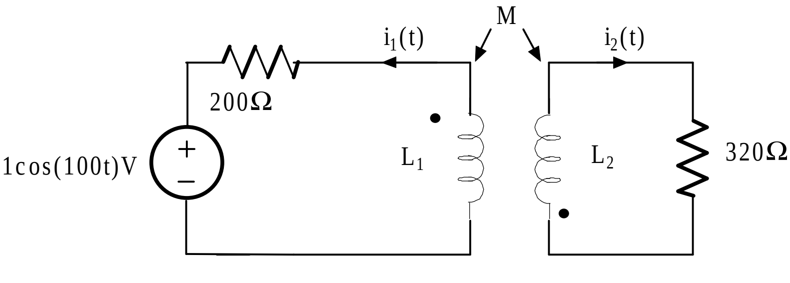
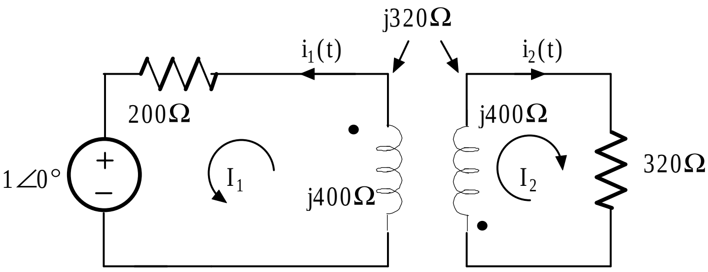


Figure P8.44

Suggested Solution

Convert to frequency domain!

$1\cos(100t) \rightarrow 1\angle 0°$; $i_1(t) \rightarrow I_1$; $i_2(t) \rightarrow I_2$ $M = k\,(L_1L_2)^{1/2} = 3.2H$



$1\angle 0° = -I_1\,(200 + j400) + j320\,I_2$ and $0 = I_2(320 + j400) - j320I_1$

$1\angle 0° = [(-1.25 + j1)(200 + j400) + j320]\,I_2$ $I_1 = I_2\,(1.25 - j1)$

$I_2 = 1 / (-650 + j20) = 1.54\angle -178.24°$ mA

$I_1 = I_2\,(1.25 - j1) = I_2\,(1.60\angle -38.66°) = 2.46\angle 143.10°$ mA

$i_2(t) = 1.54\cos(100t - 178.24°)$ mA

$i_1(t) = 2.46\cos(100t + 143.10°)$ mA

Problem 8.51

Determine I_1, I_2, V_1, and V_2 in the network in Figure P8.51

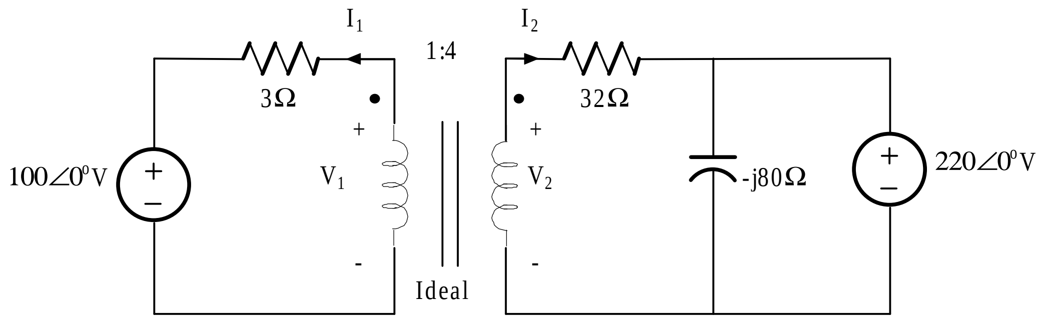
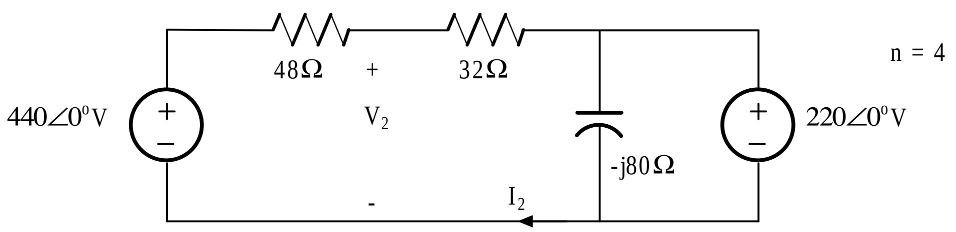


Figure P8.51

Suggested Solution



$I_2 = (440 - 220) / (80) = 2.75\angle 0^\circ A$ $\quad V_2 = 220 + 32I_2 = 308\angle 0^\circ V$

$V_1 = V_2/n = 77\angle 0^\circ V$	$I_1 = -nI_2 = 11\angle 180^\circ A$

Problem 8.55

Determine the input impedance seen by the source in the network shown in Figure P8.55

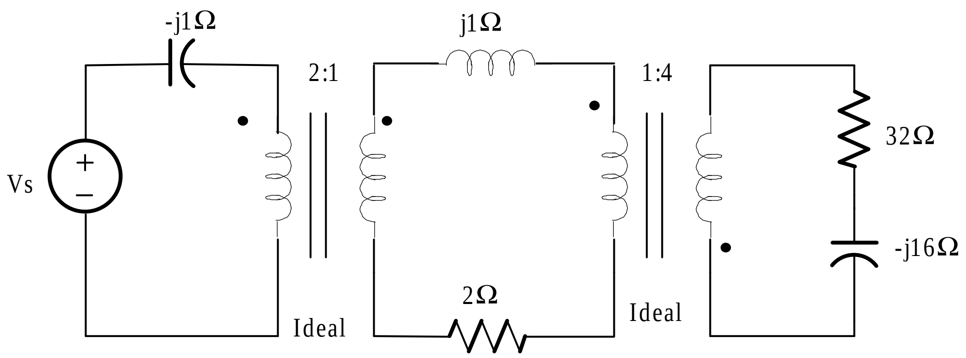
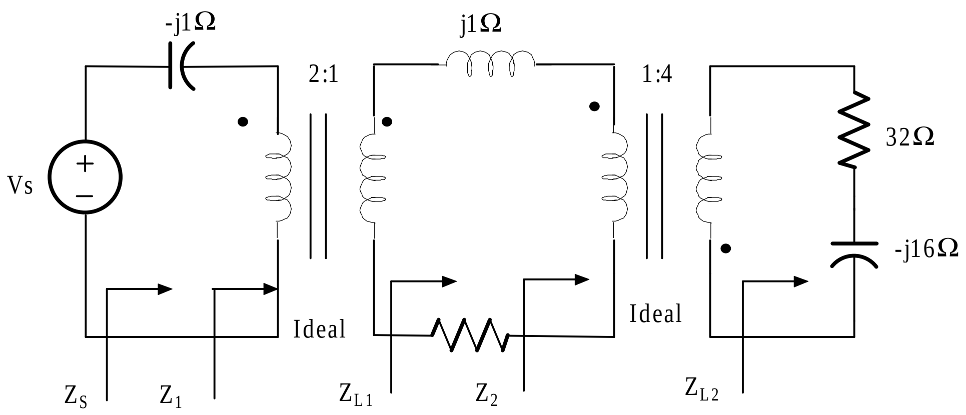


Figure P8.55

Suggested Solution



$n_2 = 4$

$n_1 = 1/2$

$Z_{L2} = 32 - j16\Omega \quad Z_2 = Z_{L2} / n_2^2 = 2 - j1\Omega$

$Z_{L1} = 2 + j1 + Z_2 = 4\Omega \quad Z_1 = Z_{L1}/n_1^2 = 16\Omega$

$Zs = 16 - j1\Omega$