Problem 8.11

Find Vo in the network in Figure P8.11

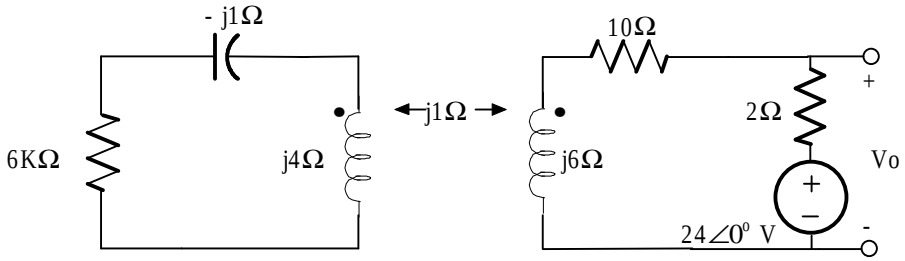
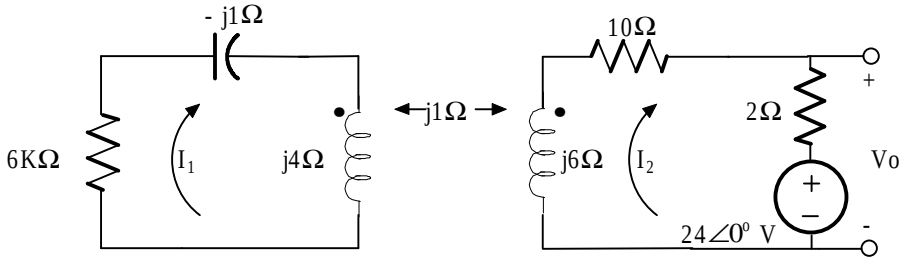


Figure 8.11

Suggested Solution



$(6 + j3)\, I_1 - jI_2 = 0$

$-jI_1 + (1_2 + j6)I_2 = -24$

$Vo = 2I_2 + 24$

$I_1 = jI_2/(6 + j3) \Rightarrow -j\,(\, j\,/\,(6 + j3)\, I_2 + (12 + j6)\, I_2 = -24$

$I_2 = -24(6 + j3)\,/\,(55 + j72) = -1.78\angle -26.1^{o}$

$Vo = 2\, I_2 + 24 = 20.86\angle 4.32^{o}$ V

Problem 8.36

Determine the impedance seen by the source in the network shown in Figure P8.36

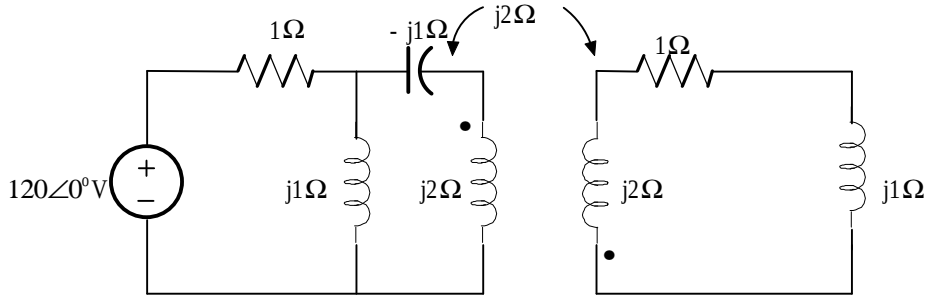
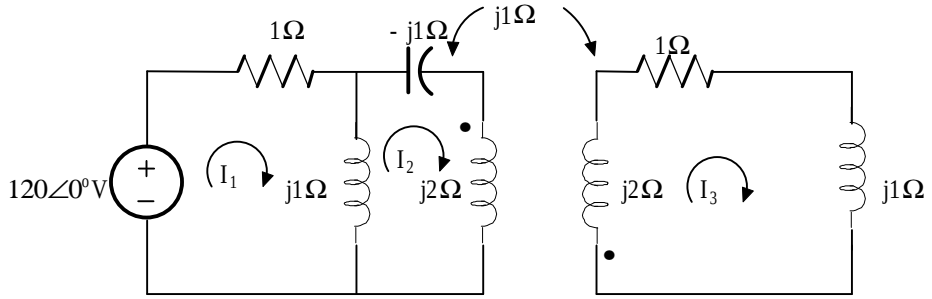


Figure P8.36

Suggested Solution



$120 = I_1 (1 + j1) - j1\ I_2$; $0 = -j1I_1 + j2I_2 - j1\ I_3$; $0 = j1I_2 + I_3(1 + j3)$ (1) (2) and (3)

solve (3) for I_2 and usbstitute into (1) and (2)

$I_2 = I_3(-3 - j1)$ => $120 = I_1(1 + j1) + I_3(-1 - j3)$; $0 = -j1I_1 + I_3(2\ 5\ j)$ (4) and (5)

Solve (5) for I_3 and substitute into (4)

$I_3 = +j1I_1 / (2 + j5)$

$120 = I_1 [\ 1 + j1 - (1 + j3)(j1) / (2 + j5)] = I_1[j6 / (2 + j5)$

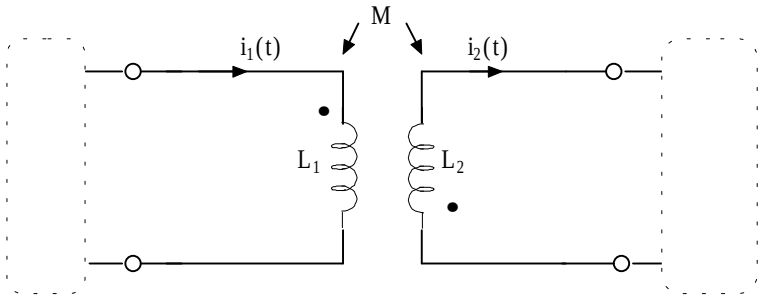
$Z_{source} = 120 / I_1 = (j\ 6) / (2 + j5)$

$Z_{source} = 1.11\angle 21.8^{o}\Omega$

Problem 8.45

Determine the energy stored in the coupled inductors in the network in P8.44

Suggested Solution



L1 = L2 = 4H k = 0.8

M = 3.2H

From problem 11.32, $i_1(t)$ and $i_2(t)$ as defined here are

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

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

$\omega(t) = 1/2\ L1\ i_2 1(t) + 1/2\ L_2\ i^2{}_2(t) + M i_1(t) i_2(t)$

Evaluate at t = 2ms

$\omega(0.002) = 3.71\ \mu J$

Problem 8.53

Determine the input impedance seen by the source in the circuit in Figure P8.53

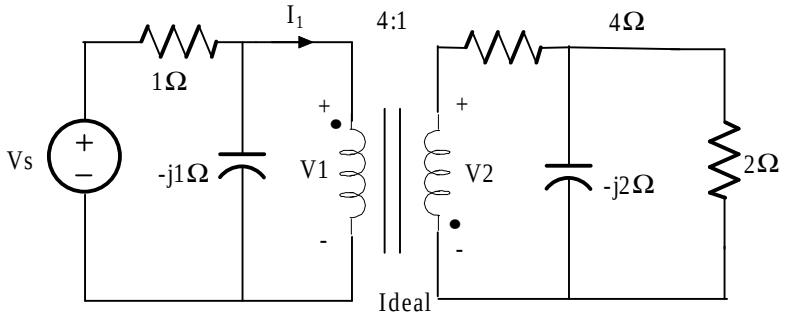
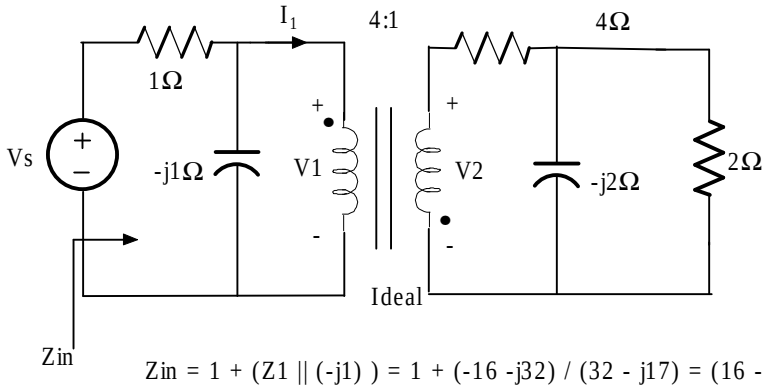


Figure P8.53

Suggested Solution



ZL = 1 + 2 || (-j2) = 2 - j1Ω

n = 1/4

Z1 = ZL/n2 = 32 - j16Ω

Zin = 1 + (Z1 || (-j1)) = 1 + (-16 -j32) / (32 - j17) = (16 - j49) / (32 - j17)

$Zin = 1.42\angle -43.94^{o}\Omega$