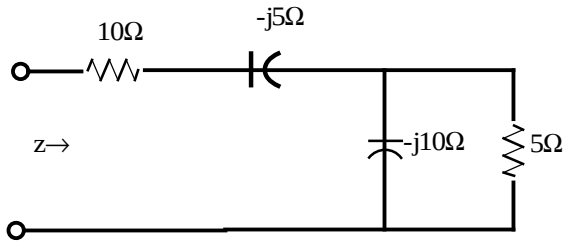
E245B
HW #7 solns., 11/08/01

Problem 7.12

Find the frequency domain impedance, **Z**, for the network shown.



Suggested Solution

$$Z = 10 - 5j + \frac{5(-10j)}{5-10j} = 10 - 5j + \frac{5(-10j)}{11.2\underline{|-23.4°}} = 10 - 5j + 4 - 2j = 14 - 7j = 15.65\underline{|-26.6°\Omega}$$

Problem 7.22

The voltages $v_R(t)$, $v_L(t)$, and $v_C(t)$ in the circuit shown can be drawn as phasors in a phasor diagram. Show that $v_R(t) + v_L(t) + v_C(t) = v_S(t)$.

Suggested Solution

$$V_R(t) = i(t)R = 2(4.37)\cos(377t + 0.75°) = 8.74\cos(377t + 0.75°)V$$

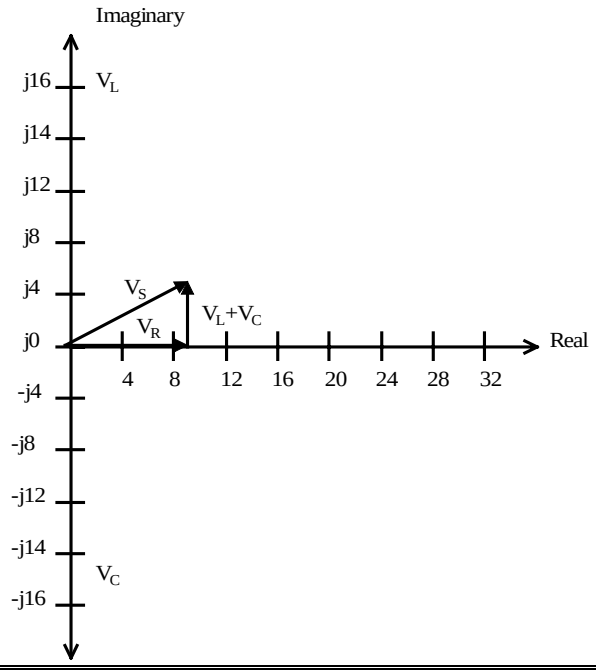
$$V_R = 8.74\underline{|0.75°}V$$

$$V_L(t) = L\frac{di}{dt} = (10^{-2})(4.37)(377)(-\sin(377t + 0.75°)) = 16.47\cos(377t + 90.75°)$$

$$V_L = 16.47\underline{|90.75°}V$$

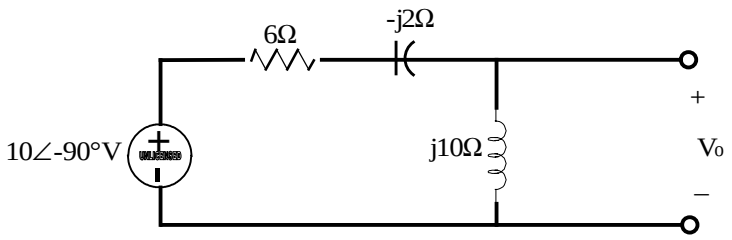
$$V_C(t) = \frac{1}{C}\int i dt = \left(\frac{1}{10^{-3}}\right)\left(\frac{1}{377}\right)(4.37)\sin(377t + 0.75°)$$

$$V_C(t) = 11.59\cos(377t - 89.25°)V$$



Problem 7.28

Find the frequency domain voltage $\mathbf{V}_0$ as shown.



Suggested Solution

$$V_0 = 10\angle -90° \frac{10j}{6-3j+10j} = \frac{(10\angle -90°)(10\angle 90°)}{10\angle 53°} = 10\angle -53.1°V$$