Practice Problem 9.7

Find the voltage $v(t)$ in a circuit described by the integrodifferential equation

$$2\frac{dv}{dt} + 5v + 10\int v\,dt = 50\cos(5t - 30°)$$

using the phasor approach.

Answer: $v(t) = 5.3\cos(5t - 88°)$ V.

Practice Problem 9.8

If voltage $v = 10\cos(100t + 30°)$ V is applied to a 50 μF capacitor, calculate the current through the capacitor.

Answer: $50\cos(100t + 120°)$ mA.

Practice Problem 9.9

Refer to Fig. 9.17. Determine $v(t)$ and $i(t)$.

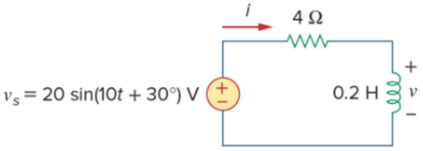

Figure 9.17
For Practice Prob. 9.9.

Answer: $8.944\sin(10t + 93.43°)$ V, $4.472\sin(10t + 3.43°)$ A.

Practice Problem 9.10

Determine the input impedance of the circuit in Fig. 9.24 at $\omega = 10$ rad/s

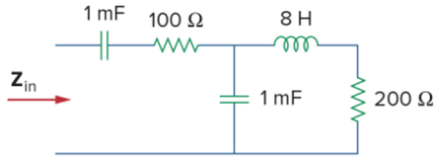

Figure 9.24
For Practice Prob. 9.10.

Answer: $(149.52 - j195)\Omega$.

Practice Problem 9.11

Calculate v_o in the circuit of Fig. 9.27.

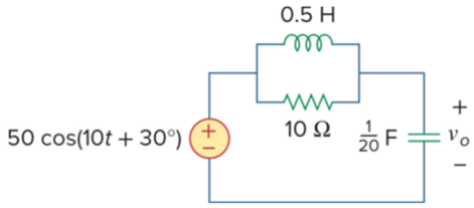

Figure 9.27
For Practice Prob. 9.11.

Answer: $v_o(t) = 35.36\cos(10t - 105°)$ V.

Note: Practice Problem 9.13 needs the knowledge of Vrms, which will be taught in Week 11.

Practice Problem 9.13

Design an *RC* circuit to provide a 90° lagging phase shift of the output voltage relative to the input voltage. If an ac voltage of 60 V rms is applied, what is the output voltage?

Answer: Figure 9.34 shows a typical design; 20 V rms.

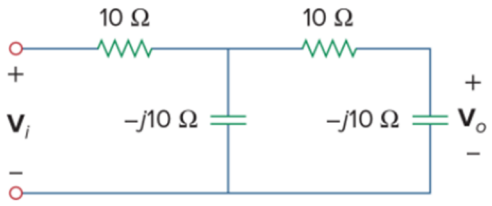

Figure 9.34
For Practice Prob. 9.13.

Practice Problem 9.14

Refer to the *RL* circuit in Fig. 9.36. If 10 V is applied to the input, find the magnitude and the phase shift produced at 5 kHz. Specify whether the phase shift is leading or lagging.

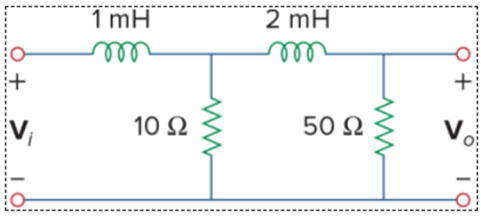

Figure 9.36
For Practice Prob. 9.14.

Answer: 1.7161 V, 120.39°, lagging.