Chapter 9, Solution 80.

$$200 \text{ mH} \longrightarrow j\omega L = j(2\pi)(60)(200\times10^{-3}) = j75.4\ \Omega$$

$$\mathbf{V}_o = \frac{j75.4}{R + 50 + j75.4}\mathbf{V}_i = \frac{j75.4}{R + 50 + j75.4}(120\angle 0°)$$

(a) When $R = 100\ \Omega$,

$$\mathbf{V}_o = \frac{j75.4}{150 + j75.4}(120\angle 0°) = \frac{(75.4\angle 90°)(120\angle 0°)}{167.88\angle 26.69°}$$

$\mathbf{V}_o =$ **53.89∠63.31° V**

(b) When $R = 0\ \Omega$,

$$\mathbf{V}_o = \frac{j75.4}{50 + j75.4}(120\angle 0°) = \frac{(75.4\angle 90°)(120\angle 0°)}{90.47\angle 56.45°}$$

$\mathbf{V}_o =$ **100∠33.55° V**

(c) To produce a phase shift of 45°, the phase of $\mathbf{V}_o = 90° + 0° - \alpha = 45°$.
Hence, α = phase of $(R + 50 + j75.4) = 45°$.
For α to be 45°, $R + 50 = 75.4$
Therefore, $R =$ **25.4 Ω**