39. (a) The capacitive reactance is

$$X_C = \frac{1}{\omega_d C} = \frac{1}{2\pi f_d C} = \frac{1}{2\pi(60.0\,\text{Hz})(70.0\times 10^{-6}\,\text{F})} = 37.9\ \Omega\ .$$

The inductive reactance $86.7\,\Omega$ is unchanged. The new impedance is

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{(160\,\Omega)^2 + (37.9\,\Omega - 86.7\,\Omega)^2} = 167\ \Omega\ .$$

The current amplitude is

$$I = \frac{\mathcal{E}_m}{Z} = \frac{36.0\,\text{V}}{167\,\Omega} = 0.216\ \text{A}\ .$$

The phase angle is

$$\phi = \tan^{-1}\left(\frac{X_L - X_C}{R}\right) = \tan^{-1}\left(\frac{86.7\,\Omega - 37.9\,\Omega}{160\,\Omega}\right) = 17.0^\circ\ .$$

(b) We first find the voltage amplitudes across the circuit elements:

$$\begin{aligned} V_R &= IR = (0.216\,\text{A})(160\,\Omega) = 34.6\ \text{V} \\ V_L &= IX_L = (0.216\,\text{A})(86.7\,\Omega) = 18.7\ \text{V} \\ V_C &= IX_C = (0.216\,\text{A})(37.9\,\Omega) = 8.19\ \text{V} \end{aligned}$$

Note that $X_L > X_C$, so that $\mathcal{E}_m$ leads I. The phasor diagram is drawn to scale below.