37. (a) Now $X_C = 0$, while $R = 160\,\Omega$ and $X_L = 86.7\,\Omega$ remain unchanged. Therefore, the impedance is

$$Z = \sqrt{R^2 + X_L^2} = \sqrt{(160\,\Omega)^2 + (86.7\,\Omega)^2} = 182\ \Omega\ .$$

The current amplitude is now found to be

$$I = \frac{\mathcal{E}_m}{Z} = \frac{36.0\,\mathrm{V}}{182\,\Omega} = 0.198\ \mathrm{A}\ .$$

The phase angle is, from Eq. 33-65,

$$\phi = \tan^{-1}\left(\frac{X_L - X_C}{R}\right) = \tan^{-1}\left(\frac{86.7\,\Omega - 0}{160\,\Omega}\right) = 28.5^\circ\ .$$

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

$$\begin{aligned} V_R &= IR = (0.198\,\mathrm{A})(160\,\Omega) &\approx 32\ \mathrm{V} \\ V_L &= IX_L = (0.216\,\mathrm{A})(86.7\,\Omega) &\approx 17\ \mathrm{V} \end{aligned}$$

This is an inductive circuit, so $\mathcal{E}_m$ leads I. The phasor diagram is drawn to scale below.