72. (a) The phase constant is given by

$$\phi = \tan^{-1}\left(\frac{V_L - V_C}{R}\right) = \tan^{-1}\left(\frac{V_L - V_L/2.00}{V_L/2.00}\right) = \tan^{-1}(1.00) = 45.0^\circ \ .$$

(b) We solve $R$ from $\mathcal{E}_m \cos\phi = IR$:

$$R = \frac{\mathcal{E}_m \cos\phi}{I} = \frac{(30.0\,\text{V})(\cos 45^\circ)}{300 \times 10^{-3}\,\text{A}} = 70.7\ \Omega \ .$$