

Physics 4L HW 5 (2026)

Use the rule of voltage division to write $V_{\text{out}}(\omega)/V_{\text{in}}(\omega)$ for all of the pair-wise R-C-L circuit combinations, as shown below. Express your answer in polar coordinate form, i.e.,

$$V_{\text{out}}(\omega)/V_{\text{in}}(\omega) = \text{Magnitude}(\omega) e^{i\phi(\omega)}, \text{ where}$$

$$\text{Magnitude} = \sqrt{(Im(V_{\text{out}}(\omega)/V_{\text{in}}(\omega)))^2 + (Re(V_{\text{out}}(\omega)/V_{\text{in}}(\omega)))^2}$$

$$\phi(\omega) = \text{atan}[Im(V_{\text{out}}(\omega)/V_{\text{in}}(\omega))/Re(V_{\text{out}}(\omega)/V_{\text{in}}(\omega))].$$

Make a Bode plot, with reasonable ranges in terms of a logarithmic scale.

Identify the asymptotic frequency dependence. For purposes of graphing, let $L = 1 \text{ H}$; $C = 1 \text{ F}$; $R = 1 \Omega$.

