Final "cheat sheet" (from chapter 8)
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You can also use previous cheat sheets.

Table 8.1.
Complex impedances

Symbol	Admittance, Y	Impedance, $Z = 1/Y$
R	$\frac{1}{R}$	R
L	$\frac{1}{i\omega L}$	$i\omega L$
C	$i\omega C$	$\frac{1}{i\omega C}$
	$I = YV$	$V = ZI$

- The loop equation for a series *RLC* circuit (with no emf source) yields a linear differential equation involving three terms, one for each element. In the underdamped case, the solution for the voltage across the capacitor is

$$V(t) = e^{-\alpha t}(A\cos\omega t + B\sin\omega t), \qquad (8.89)$$

where

$$\alpha = \frac{R}{2L} \quad \text{and} \quad \omega^2 = \frac{1}{LC} - \frac{R^2}{4L^2}. \qquad (8.90)$$

$$Q = \omega \cdot \frac{\text{energy stored}}{\text{average power dissipated}}. \tag{8.91}$$

- If we add to the series RLC circuit a sinusoidal emf source, $\mathcal{E}(t) = \mathcal{E}_0 \cos \omega t$, then the solution for the current is $I(t) = I_0 \cos(\omega t + \phi)$, where

$$I_0 = \frac{\mathcal{E}_0}{\sqrt{R^2 + (\omega L - 1/\omega C)^2}} \quad \text{and} \quad \tan \phi = \frac{1}{R\omega C} - \frac{\omega L}{R}. \tag{8.92}$$

  - The average *power* delivered to a circuit is

$$\overline{P} = \frac{1}{2} \mathcal{E}_0 I_0 \cos \phi = V_{\mathrm{rms}} I_{\mathrm{rms}} \cos \phi, \tag{8.93}$$

    where the rms values are $1/\sqrt{2}$ times the peak values. This reduces to $\overline{P}_R = V_{\mathrm{rms}}^2/R$ in the case of a single resistor.