Announcements

● Midterm #1
  ○ Monday, February 26, 8-10pm
  ○ Covers through the end of circuits material (resonant circuits / Q)

● Lab
  ○ New and Improved Lab #5 this week
  ○ No need to bring your car! (...this week only)
  ○ Buffer lab next two weeks
  ○ Midterm lab report is due 3/6
Today

- State space VDEs with no input - solving for $x(t)$
  - more phase portraits
  - basis and change of basis
  - finding $x(t)$ for a diagonal system ("uncoupled" dynamics)
  - finding $x(t)$ for a generic system ("coupled" dynamics)
Quality Factor (Q)

\[ Q \triangleq \frac{E_{\text{stored}}}{E_{\text{lost per cycle}}} = \frac{P_{\text{reactive}}}{P_{\text{avg}}} \]

\[ Q = \frac{\omega_0 L}{R} = \frac{1}{\omega_0 CR} = \frac{1}{R \sqrt{\frac{L}{C}}} \quad \omega_0 = \frac{1}{\sqrt{LC}} \]

\[ Q = \frac{R_0 L}{\omega_0 CR} = R_0 \sqrt{\frac{C}{L}} \quad \omega_0 = \frac{1}{\sqrt{LC}} \]