Problem 2

The figure below shows an electrical circuit in which simple harmonic oscillations take place.

(a) Compute the time dependent current \( I = I(t) \), that flows through the circuit.

\[
\begin{align*}
V_0 e^{i\omega t} &amp; \quad L &amp; \quad C \\
\end{align*}
\]

(b) For which value of \( R \) is the circuit at resonance?

Hint: Make an ansatz: \( I(t) = I_0 e^{i(\omega t - \phi)} \)

and compute the values for \( I_0 \) and \( \phi \).

Solution:

The differential eqn. describing the circuit takes the form:

\[
L \ddot{q} + R \dot{q} + \frac{1}{C} q = V_0 e^{i\omega t}.
\]