25. Since $\omega \approx \omega'$, we may write $T = 2\pi/\omega$ as the period and $\omega = 1/\sqrt{LC}$ as the angular frequency. The time required for 50 cycles (with 3 significant figures understood) is

$$\begin{aligned} t &= 50T = 50\left(\frac{2\pi}{\omega}\right) = 50\left(2\pi\sqrt{LC}\right) \\ &= 50\left(2\pi\sqrt{(220\times 10^{-3}\,\mathrm{H})\,(12.0\times 10^{-6}\,\mathrm{F})}\right) = 0.5104\ \mathrm{s}\ . \end{aligned}$$

The maximum charge on the capacitor decays according to

$$q_{\max} = Qe^{-Rt/2L}$$

(this is called the *exponentially decaying amplitude* in §33-5), where Q is the charge at time $t = 0$ (if we take $\phi = 0$ in Eq. 33-25). Dividing by Q and taking the natural logarithm of both sides, we obtain

$$\ln\left(\frac{q_{\max}}{Q}\right) = -\frac{Rt}{2L}$$

which leads to

$$R = -\frac{2L}{t}\ln\left(\frac{q_{\max}}{Q}\right) = -\frac{2(220\times 10^{-3}\,\mathrm{H})}{0.5104\,\mathrm{s}}\ln(0.99) = 8.66\times 10^{-3}\ \Omega\ .$$