

PHY 212 General Physics II - Electricity, Magnetism and Light
Summer 2007

Quiz 7 Thursday, Aug 02

Name:

1. (6 points) Current in an L - R series circuit with an emf \mathcal{E} and time constant $\tau = L/R$ is

$$i = \frac{\mathcal{E}}{R}(1 - e^{-t/\tau}) \quad (1)$$

(i) Current in the circuit at time $t = 0$ is:

$$i(t = 0) =$$

(ii) Current in the circuit after one time constant τ is:

$$i(t = \tau) =$$

(iii) Current in the circuit as time $t \rightarrow \infty$ is:

$$i(t \rightarrow \infty) =$$

2. (9 points) The instantaneous charge q in the capacitor of an L - C circuit is given by

$$q = Q \cos(\omega t + \phi) \quad (2)$$

where $\omega = \sqrt{1/LC}$. Show that (i) $\frac{1}{2}Li^2 + \frac{q^2}{2C} = \frac{Q^2}{2C}$ and (ii) $\frac{d^2q}{dt^2} + \frac{1}{LC}q = 0$.