86. (a) Eqs. 33-4 and 33-14 lead to

$$Q = \frac{I}{\omega} = I\sqrt{LC} = 1.27 \times 10^{-6}\ \text{C}\ .$$

(b) We choose the phase constant in Eq. 33-12 to be $\phi = -\pi/2$, so that $i_0 = I$ in Eq. 33-15). Thus, the energy in the capacitor is

$$U_E = \frac{q^2}{2C} = \frac{Q^2}{2C}(\sin\omega t)^2\ .$$

Differentiating and using the fact that $2\sin\theta\,\cos\theta = \sin 2\theta$, we obtain

$$\frac{dU_E}{dt} = \frac{Q^2}{2C}\,\omega\,\sin 2\omega t\ .$$

We find the maximum value occurs whenever $\sin 2\omega t = 1$, which leads (with $n =$ *odd* integer) to

$$t = \frac{1}{2\omega}\,\frac{n\,\pi}{2} = \frac{n\,\pi}{4\,\omega} = \frac{n\,\pi}{4}\sqrt{LC} = 8.31 \times 10^{-5}\,\text{s},\ 2.49 \times 10^{-4}\,\text{s},\ \ldots\quad .$$

(c) Returning to the above expression for dU_E/dt with the requirement that $\sin 2\omega t = 1$, we obtain

$$\left(\frac{dU_E}{dt}\right)_{\text{max}} = \frac{Q^2}{2C}\,\omega = \frac{\left(I\sqrt{LC}\right)^2}{2C}\,\frac{1}{\sqrt{LC}} = \frac{I^2}{2}\sqrt{\frac{L}{C}} = 5.44 \times 10^{-3}\ \text{J/s}\ .$$