17. (a) The total energy U is the sum of the energies in the inductor and capacitor:

$$U = U_E + U_B = \frac{q^2}{2C} + \frac{i^2 L}{2} = \frac{\left(3.80\times10^{-6}\,\text{C}\right)^2}{2\left(7.80\times10^{-6}\,\text{F}\right)} + \frac{\left(9.20\times10^{-3}\,\text{A}\right)^2\left(25.0\times10^{-3}\,\text{H}\right)}{2} = 1.98\times10^{-6}\,\text{J}.$$

(b) We solve $U = Q^2/2C$ for the maximum charge:

$$Q = \sqrt{2CU} = \sqrt{2\left(7.80\times10^{-6}\,\text{F}\right)\left(1.98\times10^{-6}\,\text{J}\right)} = 5.56\times10^{-6}\,\text{C}.$$

(c) From $U = I^2L/2$, we find the maximum current:

$$I = \sqrt{\frac{2U}{L}} = \sqrt{\frac{2\left(1.98\times10^{-6}\,\text{J}\right)}{25.0\times10^{-3}\,\text{H}}} = 1.26\times10^{-2}\,\text{A}.$$

(d) If q_0 is the charge on the capacitor at time $t = 0$, then $q_0 = Q\cos\phi$ and

$$\phi = \cos^{-1}\left(\frac{q}{Q}\right) = \cos^{-1}\left(\frac{3.80\times10^{-6}\,\text{C}}{5.56\times10^{-6}\,\text{C}}\right) = \pm 46.9^\circ.$$

For $\phi = +46.9°$ the charge on the capacitor is decreasing, for $\phi = -46.9°$ it is increasing. To check this, we calculate the derivative of q with respect to time, evaluated for $t = 0$. We obtain $-\omega Q\sin\phi$, which we wish to be positive. Since sin(+46.9°) is positive and sin(–46.9°) is negative, the correct value for increasing charge is $\phi = -46.9°$.

(e) Now we want the derivative to be negative and $\sin\phi$ to be positive. Thus, we take $\phi = +46.9°$.