61. Suppose that the switch had been in position a for a long time so that the current had reached the steady-state value i_0. The energy stored in the inductor is $U_B = \frac{1}{2}Li_0^2$. Now, the switch is thrown to position b at time $t = 0$. Thereafter the current is given by

$$i = i_0 e^{-t/\tau_L} \; ,$$

where τ_L is the inductive time constant, given by $\tau_L = L/R$. The rate at which thermal energy is generated in the resistor is given by

$$P = i^2 R = i_0^2 R e^{-2t/\tau_L} \; .$$

Over a long time period the energy dissipated is

$$\int_0^\infty P\,dt = i_0^2 R \int_0^\infty e^{-2t/\tau_L}\,dt = -\frac{1}{2} i_0^2 R \tau_L e^{-2t/\tau_L}\bigg|_0^\infty = \frac{1}{2} i_0^2 R \tau_L \; .$$

Upon substitution of $\tau_L = L/R$ this becomes $\frac{1}{2}Li_0^2$, the same as the total energy originally stored in the inductor.