

47. The current in the circuit is given by $i = i_0 e^{-t/\tau_L}$, where i_0 is the current at time $t = 0$ and τ_L is the inductive time constant (L/R). We solve for τ_L . Dividing by i_0 and taking the natural logarithm of both sides, we obtain

$$\ln\left(\frac{i}{i_0}\right) = -\frac{t}{\tau_L} .$$

This yields

$$\tau_L = -\frac{t}{\ln(i/i_0)} = -\frac{1.0 \text{ s}}{\ln((10 \times 10^{-3} \text{ A})/(1.0 \text{ A}))} = 0.217 \text{ s} .$$

Therefore, $R = L/\tau_L = 10 \text{ H}/0.217 \text{ s} = 46 \Omega$.