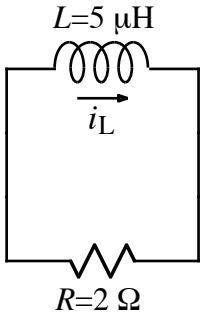
# HOMEWORK #10 solution



**EX:** Find the current, $i_L$, through the inductor in the circuit below for $t > 0$ if $i_L(t = 0) = 5$ A.




**SOL'N:** The same current flows in both the L and R, and the voltages are the same except for a minus sign:

$$v_L = L\frac{di_L}{dt} = -i_L R = -v_R$$

The inductor current, $i_L$, that solves this equation is an exponential:

$$i_L(t) = ke^{-t/(L/R)} = ke^{-t/2.5\ \mu s}$$

To satisfy the initial condition as given for $t = 0$, the value of the constant $k$ must be 5 A, since the exponential has a value of unity: $e^0 = 1$.

$$i_L(t > 0) = 5\text{A}\ e^{-t/2.5\ \mu s}$$

**NOTE:** We could actually use this solution for $t = 0$ as well, since $i_L$ doesn't change instantly at time zero.