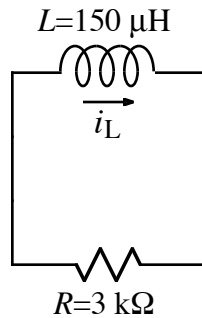


**Ex:** Find the current,  $i_L$ , through the inductor in the circuit below for  $t > 0$  if  $i_L(t = 0) = 100 \mu\text{A}$ .



**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:

$$i_L(t) = A e^{-t/(L/R)} = A e^{-t/50\text{ns}}$$

To satisfy the initial condition as given for  $t = 0$ , the value of the constant  $A$  must be  $100 \mu\text{A}$  since the exponential has a value of unity:  $e^0 = 1$ .

$$i_L(t > 0) = 100 \mu\text{A} e^{-t/50\text{ns}}$$