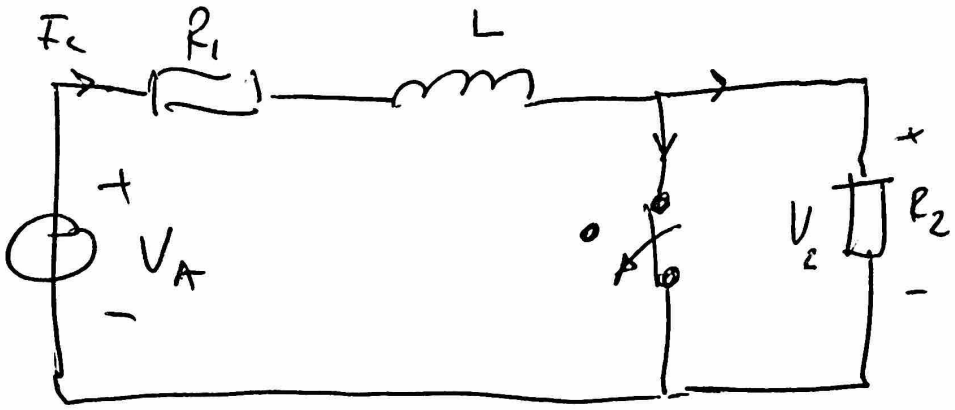
PROBLEM 3

$R_1 = 1000\ \Omega$

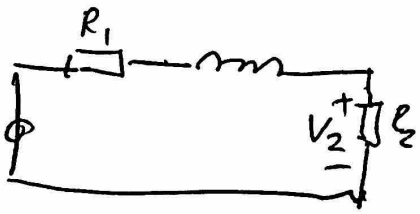
$R_2 = 100\,000\ \Omega$

$V_A = 10\ V$

$L = 0{,}001\ H$



$t > 0s \qquad I_L(t) = I(\infty) + \left(I_L(0) - I_L(\infty)\right) \cdot e^{-\frac{t}{\tau}}$



$\Rightarrow \quad I_L(\infty) = 0$

$R_{TH} = R_1 + R_2 \Rightarrow 1000 + 100000 = 101\,000\ \Omega$

$I_L(t=0)$

$t < 0s : \quad I_L = \frac{V_A}{R_1 + R_2} \Rightarrow \frac{10}{101\,600} = 90 \cdot 10^{-6} = 90\ mA$

$\tau = \frac{L}{R_{TH}} = \frac{L}{R_{TH}} \Rightarrow \frac{0.001}{101000} = 9{,}9 \cdot 10^{-9} = 9{,}9\ ns$

$I_L(t) = \frac{V_A}{R_{TH}} \cdot e^{-\frac{t}{L/R_{TH}}}$

$V_{R_2} = -I_L \cdot R_2 = -\frac{V_A \cdot R_2}{R_{TH}} \cdot e^{-\frac{t}{\tau}} \Rightarrow \frac{-10 \cdot 100000}{101000} \cdot e^{\frac{-0}{90 \cdot 10^{-6}}} = -9.9\ V$

$V_{R_2}(t=0+) = 9{,}9\ V$