1. In (a)-(c), the voltage $v_C(t)$ across a 2 $\mu$F capacitor is listed. Find the current, $i_C(t)$, flowing in the capacitor in each case as a function of time:

\[ \begin{align*}
   C & \quad v_C^+ \quad + \quad \vdots \quad i_C \quad \vdots \quad v_C^- \\
\end{align*} \]

a) $v_C(t) = 2$ V \hspace{1cm} \text{Ans: } i_C(t) = 0$ A

b) $v_C(t) = 3t$ MV/s

c) $v_C(t) = 5e^{-t/5\text{ms}}$ V \hspace{1cm} \text{Ans: } i_C(t) = -2e^{-t/5\text{ms}}$ mA

2. In (a)-(c), the current $i_L(t)$ flowing into a 5 mH inductor is listed. Find the voltage, $v_L(t)$, across the inductor in each case as a function of time:

\[ \begin{align*}
   L & \quad i_1^+ \quad \vdots \quad i_L \quad \vdots \quad v_x^- \\
\end{align*} \]

a) $i_L(t) = 2$ mA

b) $i_L(t) = 4t$ kA/s + 3 kA \hspace{1cm} \text{Ans: } v_L(t) = 20$ A

c) $i_L(t) = 15\cos(2\pi \cdot 2k \cdot t)$ mA

3. The following equation describes the voltage, $v_C$, across a capacitor as a function of time. Find the time, $t$, at which $v_C$ is equal to 1 V.

\[ v_C(t) = 6e^{-t/10\mu s} \text{ V} \]

4. The following equation describes the voltage, $v_L$, across an inductor, $L = 10$ $\mu$H, as a function of time. Find an expression for the current, $i_L(t)$, through the inductor as a function of time. Assume that $i_L(t = 0) = 200$ mA. Hint: integrate $v_L$.

\[ v_L(t) = 0.1e^{-t/50\mu s} \text{ V} \]

5. Find the voltage, $v_C$, on the capacitor in the circuit below as a function of time if $v_C(t = 0^+) = 12$ V.

\[ \begin{align*}
   C = 1$ $\mu$F & \quad + \quad v_C^- \quad \vdots \quad R = 1$ M$\Omega \\
\end{align*} \]