Homework #7-3

Problem 4)

a) $L = 40mH$

$i(t) = te^{-2t}\ A$ for $t \geq 0$

$v_L(t) = L\frac{di(t)}{dt} = 40\cdot10^{-3}\frac{d}{dt}(te^{-2t}) \Rightarrow 40\cdot10^{-3}\left[e^{-2t}\cdot 1 + t\cdot(-2)e^{-2t}\right)$

$= 40\cdot10^{-3}e^{-2t}[1-2t] \Rightarrow \boxed{0.04(1-2t)e^{-2t}\ volts}$

b) $L = 200\ mH$

$v_L(t) = 3t^2+2t+4v$ for $t \geq 0$

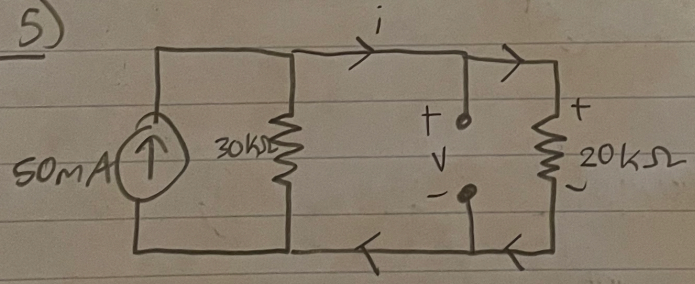
$i(0) = 1A$

$$i(t) = \frac{1}{L}\int_0^t v_L\,dt + i(0) \Rightarrow \frac{1}{200\cdot10^{-3}}\int_0^t (3t^2+2t+4)\,dt + 1$$

$$= \frac{1}{0,2}\left[3\left|\frac{t^3}{3}\right|_0^t + 2\left|\frac{t^2}{2}\right|_0^t + 4|t|_0^t\right] + 1 \Rightarrow 5(t^3+t^2+4t)+1$$

$$\boxed{= 5t^3+5t^2+20t+1}$$

Problem 5)



$$i = 5\cdot10^{-3}\cdot\frac{30k}{20+30} = 5\cdot10^{-3}\cdot\frac{30}{50}$$

$$\boxed{i = 3mA}$$

$$v = 3\cdot10^{-3}\times 20\cdot10^{-3} \boxed{= 60V}$$