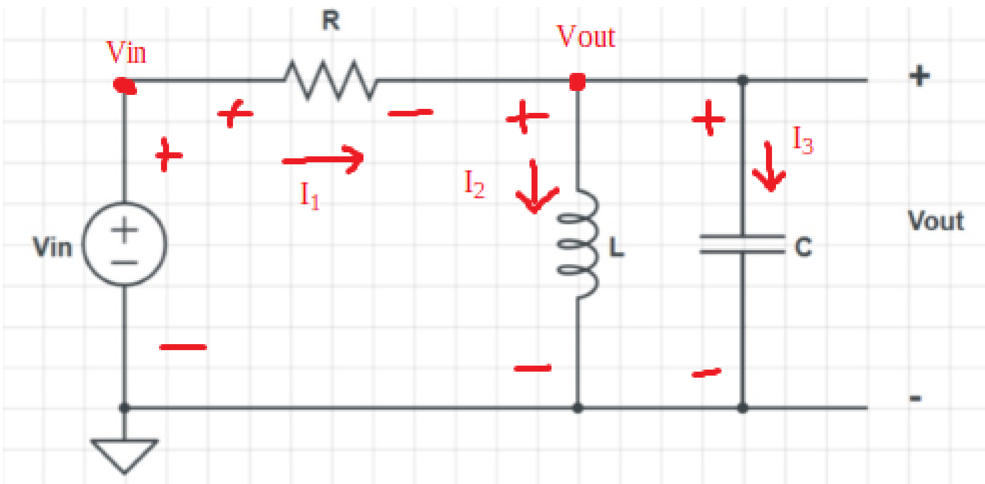

1) find transfer function $H(s)$

$$I_1 = I_2 + I_3$$

$$\left(\frac{Vin - Vout}{R}\right) = \left(C\frac{dVout}{dt}\right) + \left(\frac{1}{L}\int[Vout\,dt]\right)$$

$$RC\frac{dVout}{dt} + Vout + \frac{R}{L}\int[Vout\,dt] = Vin$$

$$\mathscr{L}\left\{RC\frac{dVout}{dt} + Vout + \frac{R}{L}\int[Vout\,dt]\right\} = \mathscr{L}\{Vin\}$$

$$RC\left(s\widetilde{Vout} + Vout(0)\right) + \left(\widetilde{Vout}\right) + \frac{R}{L}\left(\frac{1}{s}\widetilde{Vout}\right) = \widetilde{Vin}$$

lets $Vout(0)=0$ as the transfer function is defined under a zero state condition.

$$RCs\widetilde{Vout} + \widetilde{Vout} + \frac{R}{Ls}\widetilde{Vout} = \widetilde{Vin}$$

$$\left(RCs + 1 + \frac{R}{Ls}\right)\widetilde{Vout} = \widetilde{Vin}$$

$$\left(RCs + 1 + \frac{R}{Ls}\right)\frac{\widetilde{Vout}}{\widetilde{Vin}} = 1$$

$$\frac{\widetilde{Vout}}{\widetilde{Vin}} = \frac{1}{\left(RCs + 1 + \frac{R}{Ls}\right)}$$

$$\frac{\widetilde{Vout}}{\widetilde{Vin}}=\frac{L\,s}{\left(R\,C\,L\,s^2+Ls+R\right)}$$

$$\boxed{H(s)=\frac{L\,s}{\left(R\,C\,L\,s^2+Ls+R\right)}}$$

2) find impulse response $h(t)$

$$Vin=\delta(t)\quad\rightarrow\quad\widetilde{Vin}=1\quad\rightarrow\quad H(s)=\widetilde{Vout}$$

$$\mathcal{L}\{h(t)\}=\frac{\frac{L}{R\,C\,L}s}{\left(s^2+\frac{L}{R\,C\,L}s+\frac{R}{R\,C\,L}\right)}$$

$$\mathcal{L}\{h(t)\}=\frac{\frac{1}{R\,C}s}{\left(s^2+\frac{1}{R\,C}s+\frac{1}{C\,L}\right)}$$

$$\mathcal{L}\{h(t)\}=\frac{\frac{1}{R\,C}s}{\left(\left(s+\frac{1}{2\,R\,C}\right)^2-\left(\frac{1}{2\,R\,C}\right)^2+\frac{1}{C\,L}\right)}$$

let $\omega^2=\frac{1}{C\,L}-\left(\frac{1}{2\,R\,C}\right)^2$

let $\alpha=\frac{1}{2\,R\,C}$

$$\mathcal{L}\{h(t)\}=\frac{2\,\alpha\,s}{(s+\alpha)^2+\omega^2}$$

$$\mathcal{L}\{h(t)\}=2\,\alpha\left(\frac{s}{(s+\alpha)^2+\omega}\right)$$

$$\mathcal{L}\{h(t)\}=2\,\alpha\left(\frac{s+\alpha-\alpha}{(s+\alpha)^2+\omega^2}\right)$$

$$\mathcal{L}\{h(t)\}=2\,\alpha\left(\frac{s+\alpha}{(s+\alpha)^2+\omega^2}+\frac{-\alpha}{(s+\alpha)^2+\omega^2}\right)$$

$$\mathscr{L}\{h(t)\}=2\alpha\left(\frac{s+\alpha}{(s+\alpha)^2+\omega^2}\right)+2\alpha\left(\frac{-\alpha}{(s+\alpha)^2+\omega^2}\right)$$
$$\mathscr{L}\{h(t)\}=2\alpha\left(\frac{s+\alpha}{(s+\alpha)^2+\omega^2}\right)-2\alpha^2\left(\frac{1}{(s+\alpha)^2+\omega^2}\right)$$

$$\mathscr{L}\{h(t)\}=2\alpha\left(\frac{s+\alpha}{(s+\alpha)^2+\omega^2}\right)-2\alpha^2\left(\frac{\frac{\omega}{\omega}}{(s+\alpha)^2+\omega^2}\right)$$

$$\mathscr{L}\{h(t)\}=2\alpha\left(\frac{s+\alpha}{(s+\alpha)^2+\omega^2}\right)-2\frac{\alpha^2}{\omega}\left(\frac{\omega}{(s+\alpha)^2+\omega^2}\right)$$

$$h(t)=2\alpha e^{-\alpha t}\cos(\omega t)u(t)-2\frac{\alpha^2}{\omega}e^{-\alpha t}\sin(\omega t)u(t)$$

let $\omega^2=\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2$

let $\alpha=\frac{1}{2RC}$

$$h(t)=2\frac{1}{2RC}e^{\frac{-1}{2RC}t}\cos\left(\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}\,t\right)u(t)-2\frac{\left(\frac{1}{2RC}\right)^2}{\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}}e^{\frac{-1}{2RC}t}\sin\left(\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}\,t\right)u(t)$$

$$h(t)=\frac{1}{RC}e^{\frac{-1}{2RC}t}\cos\left(\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}\,t\right)u(t)-\frac{2\left(\frac{1}{2RC}\right)^2}{\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}}e^{\frac{-1}{2RC}t}\sin\left(\sqrt{\frac{1}{CL}-\left(\frac{1}{2RC}\right)^2}\,t\right)u(t)$$

for the given values: R = 1000 Ω, L = 0.027 H, and C = 10E-9 F

$$h(t)=100000e^{-100000t}\cos\left(\frac{50000\sqrt{39}}{9}t\right)u(t)-\frac{300000\sqrt{39}}{13}e^{-100000t}\sin\left(\frac{50000\sqrt{39}}{9}t\right)u(t)$$

or approximately

$$h(t)=100000e^{-100000t}\cos(34694.4t)u(t)-144115e^{-100000t}\sin(34694.4t)u(t)$$

or

$$\boxed{h(t)=175412e^{-100000t}\cos(34694.4t+55.2437°)u(t)}$$