1) $H(s) = \frac{Y(s)}{X(s)}$

$$X(s) = e^{-3t}\left(\frac{s}{s^2+16}\right) = \frac{s+3}{(s+3)^2+16}$$

$$y(t) = 5e^{-3t}(\cos 4t \cos 8 - \sin 4t \sin 8)\,u(t)$$

$$Y(s) = \frac{5\cos 8(s+3) - 5\sin(8)\cdot 4}{(s+3)^2+16}$$

$$H(s) = \frac{5\cos(8)(s+3) - 20\sin 8}{s+3}$$

$P: \{ s+3=0,\ s=-3$

$$5\cos(8)(s+3) - 20\sin 8 = 0$$

$$\cos 8(s+3) = 4\sin 8$$

$$s+3 = 4\tan 8$$

$Z: \{ s = 4\tan 8 - 3$

$$(s+3)\,Y(s) = (5\cos 8(s+3) - 20\sin 8)\,X(s)$$

$$\frac{dy}{dt} + 3y(t) = 5\cos 8\frac{dx}{dt} + 15\cos 8\,x(t) - 20\sin 8\,x(t)$$

$$h(t) = 5\cos 8 - \frac{20\sin 8}{s+3}$$

$\downarrow$

$$5\cos 8\,\delta(t) - 20\sin 8\,e^{-3t}u(t)$$

$$2.4s^2 + 7s + 5 = 1.2s^2 + s$$

$$s^2 + \frac{7}{2.4}s + \frac{5}{2.4} = \frac{1}{2}s^2 + \frac{1}{2.4}s$$

symbolab

simplify

$$\frac{2.1s}{1.5s^2+1+2.1s} \quad \frac{\frac{14}{10}s}{s^2+\frac{14}{10}s+\frac{2}{3}} \quad \frac{\frac{14}{10}s}{\left(s+\frac{7}{10}\right)^2+\sqrt{\frac{53}{100}}^2} = \frac{14}{10}\left(\frac{s+\frac{7}{10}}{\left(s+\frac{7}{10}\right)^2+\sqrt{\frac{53}{100}}^2} - \frac{\frac{7}{10}}{\left(s+\frac{7}{10}\right)^2+\sqrt{\frac{53}{100}}}\right)$$

$$\frac{7}{10}\cdot\frac{7}{10} = \frac{49}{100}$$

$$\frac{1.4s}{(s+10)\left(\left(s+\frac{7}{10}\right)^2+\sqrt{\frac{53}{100}}^2\right)} = \frac{A}{s+10} + \frac{B}{\left(s+\frac{7}{10}\right)^2+\sqrt{\frac{53}{100}}^2}$$

$$A = \frac{1.4\cdot -10}{\left(-10+\frac{7}{10}\right)^2+\frac{53}{100}}$$

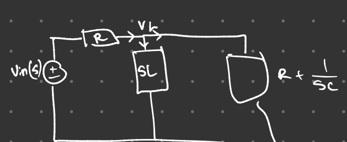
$$1.4s + 0.160882555734\{$$

$$V_L = \frac{V_{in}}{R}\left(\frac{1}{\frac{1}{R}-\frac{1}{sL}-\frac{1}{R+\frac{1}{sC}}}\right)$$

$$\frac{V_L}{V_{in}} = \frac{1}{R}\left(\frac{1}{\frac{1}{R}+\frac{1}{sL}+\frac{1}{R+\frac{1}{sC}}}\right)$$

$$\frac{V_{in}}{R} = V_L\left(\frac{1}{R}+\frac{1}{sC}+\frac{1}{R+\frac{1}{sC}}\right)$$

$$\frac{V_{in}}{R} - V_L\left(\frac{1}{R}-\frac{1}{sC}-\frac{1}{R+\frac{1}{sC}}\right) = 0$$



$$\frac{V_{in}}{R} - \frac{V_L}{R} - \frac{V_L}{sL} - \frac{V_L}{R+\frac{1}{sC}} = 0$$

$\uparrow$

$$\frac{V_{in}-V_L}{R} - \frac{V_L}{sL} - \frac{V_L}{R+\frac{1}{sC}} = 0$$

$$\frac{V_{in}-V_L}{R} - \frac{V_L\left(R+\frac{1}{sC}\right)}{sL\left(R+\frac{1}{sC}\right)} - \frac{V_L(sL)}{sL\left(R+\frac{1}{sC}\right)} = 0$$

$$\frac{V_{in}-V_L}{R} = \frac{V_L\left(R+\frac{1}{sC}\right) + V_L(sL)}{sL\left(R+\frac{1}{sC}\right)}$$

$$\frac{V_{in}-V_L}{R} = V_L\left(\frac{R+\frac{1}{sC}+sL}{sL\left(R+\frac{1}{sC}\right)}\right)$$

$$V_{in} - V_L = V_L R\left(\frac{R+\frac{1}{sC}+sL}{sL\left(R+\frac{1}{sC}\right)}\right)$$

$$\frac{V_L}{V_{in}} = \frac{1}{R\left(\frac{R+\frac{1}{sC}+sL}{sL\left(R+\frac{1}{sC}\right)}\right)}$$