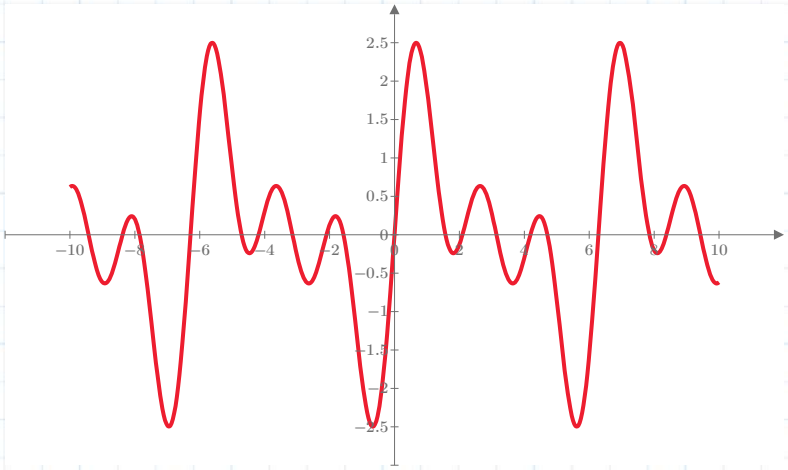
National Institute of Technology, Gifu College
Electrical and Computer Engineering
by T.Tokoro

Ex.S2 Response of electric circuit when impulse response and input signal are shown as follows. Sinusoidal waves input. R=1 Ω,L=1 H (Series connection)

$R := 1$ $L := 1$ $Z(s) := R + s \cdot L$ $h(t) := e^{-t}$ impulse response

$h(t) := e^{-t} \xrightarrow{laplace} \frac{1}{s+1}$ $H(s) := \frac{1}{s+1}$ $R := 1$ $\omega := 1$ $L := 1$

$x(t) := \sin(t) + \sin(2 \cdot t) + \sin(3 \cdot t)$ *input_signal*

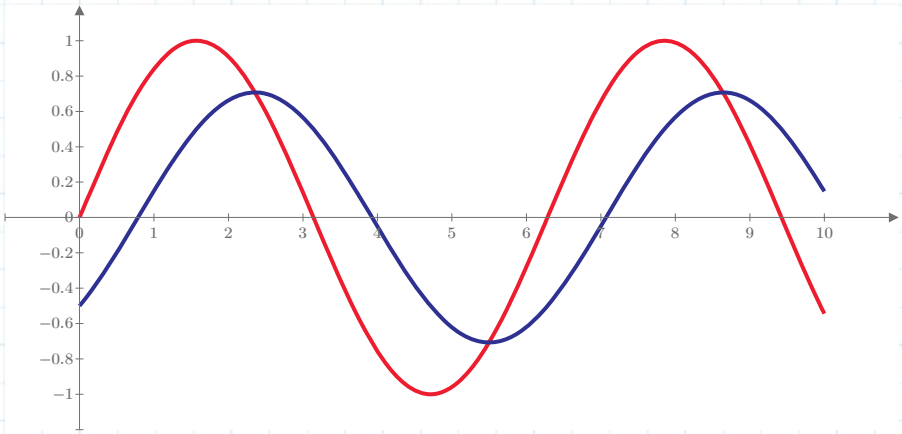


$x(t)$

t

$x_1(t) := \sin(\omega \cdot t)$ $y_1(t) := \frac{1}{\sqrt{R^2 + (\omega \cdot L)^2}} \cdot \sin\left(\omega \cdot t - \operatorname{atan}\left(\frac{\omega \cdot L}{R}\right)\right)$

output_signal



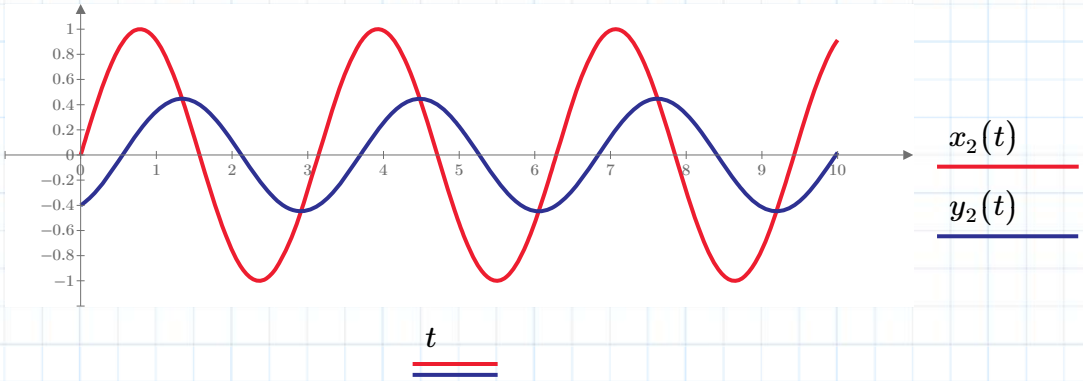
$x_1(t)$

$y_1(t)$

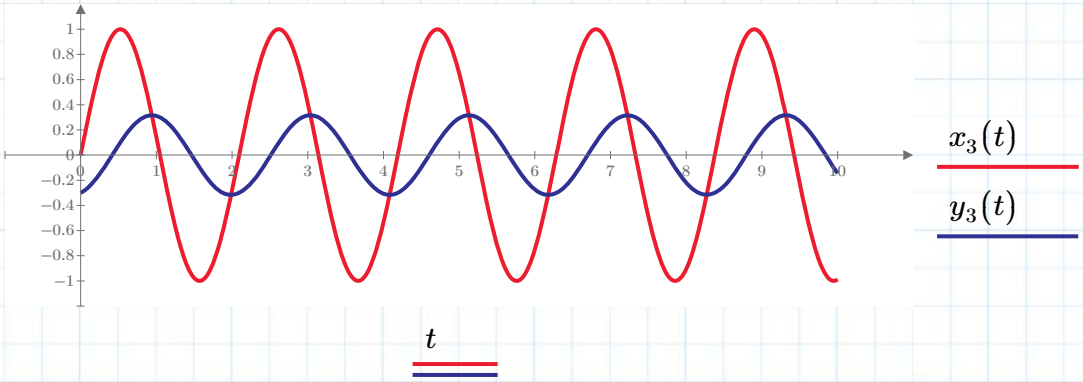
t

National Institute of Technology, Gifu College
Electrical and Computer Engineering
by T.Tokoro

$$x_2(t) := \sin(2 \cdot \omega \cdot t) \qquad y_2(t) := \frac{1}{\sqrt{R^2 + (2 \cdot \omega \cdot L)^2}} \cdot \sin\left(2 \cdot \omega \cdot t - \operatorname{atan}\left(\frac{2 \cdot \omega \cdot L}{R}\right)\right)$$



$$x_3(t) := \sin(3 \cdot \omega \cdot t) \qquad y_3(t) := \frac{1}{\sqrt{R^2 + (3 \cdot \omega \cdot L)^2}} \cdot \sin\left(3 \cdot \omega \cdot t - \operatorname{atan}\left(\frac{3 \cdot \omega \cdot L}{R}\right)\right)$$



$$x(t) := x_1(t) + x_2(t) + x_3(t) \qquad y(t) := y_1(t) + y_2(t) + y_3(t)$$