$G(s) = \frac{Y(s)}{U(s)} = \frac{4}{s+1}$ $\quad u(t) = 2 \cdot \sin \omega t$ $\quad y(t) = ?$

$\mathcal{L}[u(t)] = U(s) \quad \mathcal{L}[y(t)] = Y(s)$

$U(s) = 2 \cdot \frac{\omega}{s^2 + \omega^2}$

$Y(s) = G(s) \cdot U(s)$

$Y(s) = \frac{4}{s+1} \cdot \frac{2\omega}{s^2 + \omega^2} = \frac{8\omega}{(s+1)(s+j\omega)(s-j\omega)}$

$s^2 + \omega^2 = 0$

$s_1 = j\omega \;\vee\; s_2 = -j\omega$

$Y(s) = \frac{A_1}{(s+1)} + \frac{A_2}{(s+j\omega)} + \frac{A_3}{(s-j\omega)}$

$y(t) = A_1 \cdot e^{-1t} + A_2 \cdot e^{-j\omega t} + A_3 \cdot e^{j\omega t}$

$A_1 = \frac{8\omega}{(s+1)(s+j\omega)(s-j\omega)} \cdot (s+1)\Big|_{s=-1} = \frac{8\omega}{(-1+j\omega)(-1-j\omega)} = \frac{8\omega}{1+j\omega-j\omega+\omega^2} = \frac{8\omega}{1+\omega^2}$

$A_2 = \frac{8\omega}{(s+1)(s+j\omega)(s-j\omega)} \cdot (s+j\omega)\Big|_{s=-j\omega} = \frac{8\omega}{(-j\omega+1)(-j\omega-j\omega)} = \frac{8\omega}{(-j\omega+1)\cdot(-j2\omega)} = \frac{8\omega}{-2\omega^2+j2\omega}$

$A_3 = \frac{8\omega}{(s+1)(s+j\omega)(s-j\omega)} \cdot (s-j\omega)\Big|_{s=j\omega} = \frac{8\omega}{(j\omega+1)\cdot 2j\omega} = \frac{8\omega}{-2\omega^2+2j\omega}$

$A_1 = \frac{8\omega}{1+\omega^2} \quad A_2 = \frac{4\omega}{-\omega^2+j\omega} \quad A_3 = \frac{4\omega}{-\omega^2+j\omega}$

$y(t) = \frac{8\omega}{1+\omega^2} \cdot e^{-1t} + \frac{4\omega}{(-\omega^2-j\omega)} \cdot e^{-j\omega t} + \frac{4\omega}{(-\omega^2+j\omega)} \cdot e^{j\omega t}$