$$\varphi_1(p)\,\varphi_2(p) = \int_0^\infty e^{-pt} f_{(1)} * f_{(2)}\, dt$$

$$\mathcal{L}^{-1} \varphi_1(p)\,\varphi_2(p) = f_1 * f_2$$

$$\varphi_1(p)\,\varphi_2(p) = \mathcal{L}\, f_1 * f_2$$

$$m y'' + f y' + \varkappa y = \mathcal{Q}(t)$$

$y(0) = 0$

$y'(0) = v_0$

$\mathcal{L} y' = p\bar{y}$

$\mathcal{L} y'' = p^2 \bar{y} - v_0$

$$m(p^2\bar{y} - v_0) + f p \bar{y} + \varkappa \bar{y} = \bar{\mathcal{Q}}$$

$$\bar{y} = \bar{\mathcal{Q}}(p)\left\{\frac{1}{\left[\left(p + \frac{f}{2m}\right)^2 + \omega^2\right] m} + \frac{v_0}{\left(p + \frac{f}{2m}\right)^2 + \omega^2}\right.$$

$$\omega^2 = \frac{\varkappa}{m} - \frac{f^2}{4m^2} > 0$$

$$y = \frac{1}{m\omega}\int_0^t \mathcal{Q}(t-s)\, e^{-\frac{f}{2m}s} \sin\omega s\, ds + \frac{v_0}{\omega} e^{-\frac{f}{2m}t} \sin\omega t$$

$$= \frac{1}{m\omega}\int_0^t \mathcal{Q}(s)\, e^{-\frac{f}{2m}(t-s)} \sin\omega(t-s)\, ds + \frac{v_0}{\omega} e^{-\frac{f}{2m}t} \sin\omega t$$