Calcular $\mathcal{L}\{\ \}$ de :

$$\mathcal{L}\{\underbrace{f(t)e^{t}}_{h(t)} * \underbrace{t^2 g(t)}_{a(t)}\} = \mathcal{L}\{h(t)\}\cdot\mathcal{L}\{a(t)\}$$

$$= \mathcal{L}\{f(t)e^{t}\}\cdot\mathcal{L}\{t^2 g(t)\}$$

$$\left(\mathcal{L}\{f(t)\}_{s\to s-1}\right)\cdot\left((-1)^2\frac{d}{ds^2}\left[\mathcal{L}\{g(t)\}\right]\right)$$

$$\left(F(s)\big|_{s\to s-1}\right)\cdot\left(\frac{d}{ds^2}\left[G(s)\right]\right)$$

$$F(s-1)\,G''(s)$$



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Calcular $\mathcal{L}\{\ \}$ de :

$$\mathcal{L}\left\{\int_0^t \underbrace{\mathbf{3}}_{\substack{\tau \\ \downarrow \\ 3}} \cdot \underbrace{(\boldsymbol{t}-\boldsymbol{\tau})^4}_{\substack{t-\tau \\ \downarrow \\ t^4}} \boldsymbol{d\tau}\right\} = \mathcal{L}\left\{\int_0^t f(\tau)g(t-\tau)d\tau\right\}$$

$$= \mathcal{L}\{f(t)\}\cdot\mathcal{L}\{g(t)\}$$

$$\mathcal{L}\{\underset{\substack{\downarrow \\ \tau}}{3} * \underset{\substack{\downarrow \\ t-\tau}}{t^4}\} = \mathcal{L}\{3\}\cdot\mathcal{L}\{t^4\}$$

$$= \left(\frac{3}{s}\right)\left(\frac{4!}{s^5}\right)$$

$$= \frac{72}{s^6}$$



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Calcular $\mathcal{L}\{\ \}$ de :

$$\mathcal{L}\left\{\int_0^t \underbrace{e^{t-\tau}\cdot \sin(t-\tau)}_{t-\tau \to t} \cdot \underbrace{\tau}_{\tau \to t}\, d\tau\right\}$$

$t-\tau \to t$ ↓ $e^t \cdot \text{SEN}(t)$

$\tau \to t$ ↓ $t$

$$\mathcal{L}\{e^t \text{SEN}(t) * t\} = \mathcal{L}\{e^t \cdot \text{SEN}(t)\}\cdot \mathcal{L}\{t\}$$

$$= \left(\frac{1}{s^2+1}\Big|_{s\to s-1}\right)\cdot\left(\frac{1}{s^2}\right)$$

$$= \frac{1}{s^2\cdot((s-1)^2+1)}$$


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Calcular $\mathcal{L}\{\ \}$ de :

$$\mathcal{L}\left\{6\int_0^t e^{\tau-t}\cdot \underbrace{f(t-\tau)}_{f(\tau-t)}d\tau\right\} = \mathcal{L}\left\{\underbrace{6}_{\tau\to t \,\to\, 6}\int_0^t \underbrace{e^{-(t-\tau)}\cdot f(t-\tau)}_{t-\tau\to t \,\to\, e^{-t}f(t)}\,d\tau\right\}$$

$$\mathcal{L}\{6 * e^{-t}f(t)\} = \mathcal{L}\{6\}\cdot\mathcal{L}\{e^{-t}f(t)\}$$

$$\left(\frac{6}{s}\right)\cdot\left(F(s)\big|_{s\to s+1}\right)$$

$$= \frac{6F(s+1)}{s}$$


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