$\underline{\sigma > 0}$: $\quad R e^{-\sigma R} \xrightarrow{R\to\infty} 0$

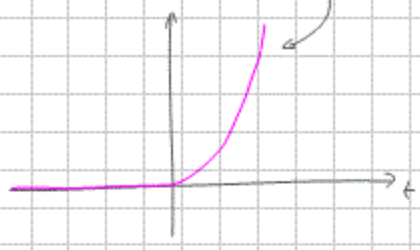
$e^{-\sigma R} \xrightarrow{R\to\infty} 0$

$\mathrm{Re}\{s\} > 0$
$\underline{\underline{\sigma > 0}}$ $\Rightarrow$

$$\Big) = 0 - \frac{1}{s^2}\big(0 - 1\big) = \frac{1}{s^2}$$

$$\boxed{r(t) = t\cdot u(t) \quad \circ\!\!-\!\!\bullet \quad R(s) = \frac{1}{s^2}} \qquad ROC = \{ s\in\mathbb{C} \mid \mathrm{Re}\{s\} > 0\}$$

$$p(t) = t^2\cdot u(t) \quad \circ\!\!-\!\!\bullet \quad P(s) = \int_0^{+\infty} \underbrace{t^2}_{u}\, \underbrace{e^{-st}}_{v'}\, dt$$



$$= \underbrace{t^2}_{u}\, \underbrace{\frac{e^{-st}}{-s}}_{v}\Big|_0^{\infty} - \int_0^{\infty} \underbrace{\underbrace{2t}_{u'}}_{u}\, \underbrace{\underbrace{\frac{e^{-st}}{-s}}_{v}}_{v'}\, dt$$

$$= \underbrace{\lim_{R\to\infty} \frac{R^2 e^{-sR}}{-s}}_{0} - 0 - \left(\underbrace{\underbrace{2t}_{u}\, \underbrace{\frac{e^{-st}}{(-s)^2}}_{v}\Big|_0^{\infty}}_{0} - \int_0^{\infty} \underbrace{2\cdot 1}_{u'}\, \underbrace{\frac{e^{-st}}{(-s)^2}}_{v} dt \right)$$

falls $\mathrm{Re}\{s\} > 0$

$$= 2\cdot 1\, \frac{e^{-st}}{(-s)^3}\Big|_0^{\infty} = \frac{2\cdot 1}{(-s)^3}\Big(\underbrace{\lim_{R\to\infty} e^{-sR}}_{0} - \underbrace{e^{-s\cdot 0}}_{1} \Big)$$

$$= \frac{2!}{s^3}$$

$$\boxed{t^n u(t) \quad \circ\!\!-\!\!\bullet \quad \frac{n!}{s^{n+1}} \qquad ROC = \{ s\in\mathbb{C} \mid \mathrm{Re}\{s\} > 0\}}$$

$n\in\mathbb{N}$

Linearität:

$f(t) \quad \circ\!\!-\!\!\bullet \quad F(s)$

$g(t) \quad \circ\!\!-\!\!\bullet \quad G(s)$, $\quad \alpha, \beta \in \mathbb{C}$

$\rightarrow \quad \alpha f(t) + \beta g(t) \quad \circ\!\!-\!\!\bullet \quad \alpha F(s) + \beta G(s)$

„$ROC \supseteq ROC(F) \cap ROC(G)$"

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$$\int_{-\infty}^{+\infty} \big(\alpha f(t) + \beta g(t)\big) e^{-st}\, dt = \alpha \int_{-\infty}^{+\infty} f(t) e^{-st}\, dt + \beta \int_{-\infty}^{+\infty} g(t) e^{-st}\, dt$$