Table of Laplace Transforms

$$\mathscr{L}\{f(t)\} = \int_0^\infty e^{-st} f(t)\, dt = F(s)$$

$f(t)$	$\mathscr{L}\{f(t)\} = F(s)$
1	$\dfrac{1}{s}$
t^n	$\dfrac{n!}{s^{n+1}}$
$\sin \omega t$	$\dfrac{\omega}{s^2+\omega^2}$
$e^{at} \sin \omega t$	$\dfrac{\omega}{(s-a)^2+\omega^2}$
$t \sin \omega t$	$\dfrac{2\omega s}{(s^2+\omega^2)^2}$
$\dfrac{\sin \omega t - \omega t \cos \omega t}{2\omega^3}$	$\dfrac{1}{(s^2+\omega^2)^2}$
$\delta(t)$	1

$f(t)$	$\mathscr{L}\{f(t)\} = F(s)$
e^{at}	$\dfrac{1}{s-a}$
$\dfrac{e^{at} t^n}{n!}$	$\dfrac{1}{(s-a)^{n+1}}$
$\cos \omega t$	$\dfrac{s}{s^2+\omega^2}$
$e^{at} \cos \omega t$	$\dfrac{s-a}{(s-a)^2+\omega^2}$
$t \cos \omega t$	$\dfrac{s^2-\omega^2}{(s^2+\omega^2)^2}$
$\mathcal{U}(t-a)$	$\dfrac{e^{-as}}{s}$
$\delta(t-a)$	e^{-as}

$$\mathscr{L}\{\alpha f(t) + \beta g(t)\} = \alpha \mathscr{L}\{f(t)\} + \beta \mathscr{L}\{g(t)\}$$

$$\mathscr{L}\{e^{at} f(t)\} = F(s-a) \qquad \mathscr{L}\{t^n f(t)\} = (-1)^n \frac{d^n}{ds^n} F(s)$$

$$\mathscr{L}^{-1}\{e^{-as} F(s)\} = f(t-a)\,\mathcal{U}(t-a) \qquad \mathscr{L}\{f(t)\,\mathcal{U}(t-a)\} = e^{-as} \mathscr{L}\{f(t+a)\}$$

$$\mathscr{L}\{f'(t)\} = sF(s) - f(0) \qquad \mathscr{L}\{f''(t)\} = s^2 F(s) - sf(0) - f'(0)$$

$$\mathscr{L}\{f^{(n)}(t)\} = s^n F(s) - s^{n-1} f(0) - \cdots - f^{(n-1)}(0)$$

$$f(t) * g(t) = \int_0^t f(\theta) g(t-\theta)\, d\theta \implies \mathscr{L}\{f(t) * g(t)\} = F(s)G(s)$$

$$\mathscr{L}\left\{ \int_0^t f(\theta)\, d\theta \right\} = \frac{F(s)}{s}$$

$$f(t) \text{ has period } T \implies \mathscr{L}\{f(t)\} = \frac{1}{1-e^{-sT}} \int_0^T e^{-st} f(t)\, dt$$

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