

Table of Laplace Transforms

1 Functional Properties

$f(t) = \mathcal{L}^{-1}\{F\}(t)$	$F(s) = \mathcal{L}\{f\}(s)$
$\alpha f(t) + \beta g(t)$	$\alpha F(s) + \beta G(s)$
$f'(t)$	$sF(s) - f(0)$
$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
$f^{(n)}(t)$	$s^n F(s) - s^{n-1}f(0) - s^{n-2}f'(0) - \dots - sf^{(n-2)}(0) - f^{(n-1)}(0)$
$t^n f(t)$	$(-1)^n \frac{d^n}{ds^n} [F(s)]$
$e^{at} f(t)$	$F(s - a)$
$u(t - c)f(t - c)$ (for $c \geq 0$)	$e^{-cs} F(s)$
$u(t - c)f(t)$ (for $c \geq 0$)	$e^{-cs} \mathcal{L}\{f(t + c)\}(s)$
$\int_0^t f(t - \tau)g(\tau)d\tau$	$F(s)G(s)$

2 Specific Transforms

$f(t) = \mathcal{L}^{-1}\{F\}(t)$	$F(s) = \mathcal{L}\{f\}(s)$
1	$\frac{1}{s}$
t^n	$\frac{n!}{s^{n+1}}$
$\frac{1}{\sqrt{t}}$	$\sqrt{\frac{\pi}{s}}$
\sqrt{t}	$\frac{\sqrt{\pi}}{2} \frac{1}{s^{3/2}}$
e^{at}	$\frac{1}{s-a}$
$\sin(at)$	$\frac{a}{s^2+a^2}$
$\cos(at)$	$\frac{s}{s^2+a^2}$
$e^{at} \sin(bt)$	$\frac{b}{(s-a)^2+b^2}$
$e^{at} \cos(bt)$	$\frac{s-a}{(s-a)^2+b^2}$
$u(t-c)$ (for $c \geq 0$)	$\frac{e^{-cs}}{s}$
$\delta(t-c)$ (for $c \geq 0$)	e^{-cs}