Laplace Transforms

$$\mathscr{L}[f(t)] = \int_0^\infty e^{-st} f(t)\, dt \qquad \mathscr{L}^{-1}[F(s)] = 2i\pi \lim_{\tau \to \infty} \int_{\gamma - i\tau}^{\gamma + i\tau} e^{st} F(s)\, ds$$

$f(t) = \mathscr{L}^{-1}[F(s)]$	$F(s) = \mathscr{L}[f(t)]$
1	$\frac{1}{s}$
e^{at}	$\frac{1}{s-a}$
t^n	$\frac{n!}{s^{n+1}}$
$\sin(at)$	$\frac{a}{s^2+a^2}$
$\cos(at)$	$\frac{s}{s^2+a^2}$
$\sinh(at)$	$\frac{a}{s^2-a^2}$
$\cosh(at)$	$\frac{s}{s^2-a^2}$
$e^{at}\sin(bt)$	$\frac{b}{(s-a)^2+b^2}$
$e^{at}\cos(bt)$	$\frac{s-a}{(s-a)^2+b^2}$
$t^n e^{at}$	$\frac{n!}{(s-a)^{n+1}}$
$f'(t)$	$sF(s) - f(0)$
$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
$\int_0^t f(t-\tau)g(\tau)\, d\tau$	$F(s)G(s)$
$\delta(t-c) = \begin{cases} \infty, & (t-c) = 0 \\ 0, & (t-c) \neq 0 \end{cases}$	e^{-cs}