Table of Laplace Transforms

$f(t)$	$F(s) = \mathscr{L}\{f(t)\}$	$f(t)$	$F(s) = \mathscr{L}\{f(t)\}$
1	$\frac{1}{s}$	e^{-at}	$\frac{1}{s+a}$
C	$\frac{C}{s}$	e^{at}	$\frac{1}{s-a}$
t	$\frac{1}{s^2}$	$\sin(\omega t)$	$\frac{\omega}{s^2+\omega^2}$
t^2	$\frac{2}{s^3}$	$\cos(\omega t)$	$\frac{s}{s^2+\omega^2}$
t^3	$\frac{6}{s^4}$	$\sinh(\omega t)$	$\frac{\omega}{s^2-\omega^2}$
$t^n, \quad t = 1, 2, 3, \ldots$	$\frac{n!}{s^{n+1}}$	$\cosh(\omega t)$	$\frac{s}{s^2-\omega^2}$
$t^r, \quad r > -1$	$\frac{\Gamma(r+1)}{s^{r+1}}$	$u(t-a)$	$\frac{e^{-as}}{s}$

where $\Gamma(r) = \int_0^\infty x^{r-1} e^{-x}\,dx$

Properties of Laplace the Transform

$\phi(t)$	$\Phi(s) = \mathscr{L}\{\phi(t)\}$
$e^{-at} f(t)$	$F(s+a)$
$f(t-a)u(t-a)$	e^{-as}
$f'(t)$	$sF(s) - f(0)$
$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
$f'''(t)$	$s^3F(s) - s^2f(0) - sf'(0) - f''(0)$
$f^{(n)}(t)$	$s^nF(s) - s^{n-1}f(0) - \cdots - sf^{(n-2)}(t) - f^{(n-1)}(t)$
$tf(t)$	$-F'(s)$
$t^n f(t)$	$(-1)^n F^{(n)}(s)$
$\frac{1}{t} f(t)$	$\int_s^\infty F(\sigma)\,d\sigma$
$\int_0^t f(\tau)\,d\tau$	$\frac{1}{s}F(s)$
$f(t) * g(t)$	$F(s)G(s)$