

LAPLACE TRANSFORMS

Transform of basic functions

$f(t)$	$L[f(t)]$
1	$\frac{1}{s}$
e^{at}	$\frac{1}{s-a}$
$\cos(at)$	$\frac{s}{s^2+a^2}$
$\sin(at)$	$\frac{a}{s^2+a^2}$
$\cosh(at)$	$\frac{s}{s^2-a^2}$
$\sinh(at)$	$\frac{a}{s^2-a^2}$
t^n	$\frac{n!}{s^{n+1}}$
$u_c(t)$	$\frac{e^{-cs}}{s}$
$\delta(t)$	1
$\delta(t-c)$	e^{-cs}
$u_c(t)f(t-c)$	$e^{-cs}F(s)$, where $F = L[f]$
$e^{ct}f(t)$	$F(s-c)$, where $F = L[f]$
$(f \star g)(t)$	$L[f] L[g]$

Convolution

$$(f \star g)(t) = \int_0^t f(\tau) g(t-\tau) d\tau$$

Transform of derivatives

$$L[y'(t)] = sL[y] - y(0)$$

$$L[y''(t)] = s^2L[y] - sy(0) - y'(0)$$

$$L[y^{(n)}(t)] = s^nL[y] - s^{(n-1)}y(0) - s^{(n-2)}y'(0) - \dots - y^{(n-1)}(0)$$
