TABLES OF LAPLACE TRANSFORMS

GENERAL FORMULÆ

$f(t)$	$F(p)$	$f(t)$	$F(p)$
$f'(t)$	$pF(p) - f(0)$	$f''(t)$	$p^2F(p) - sf(0) - f'(0)$
$f^{(n)}(t)$	$p^nF(s) - s^{n-1}f(0) - \cdots$ $\cdots - f^{(n-1)}(0)$		
$tf(t)$	$-F'(p)$	$\dfrac{f(t)}{t}$	$\int_{/}^{\infty} F(p')dp'$
$\int_0^t f(t')dt'$	$\dfrac{1}{p}F(p)$	$\int_0^t \int_0^\tau f(\nu)\, d\nu d\tau$	$\dfrac{1}{p^2}F(p)$
t–shifting $f(t-a)u(t-a)$	$e^{-ap}F(p)$	p–shifting $e^{at}f(t)$	$F(p-a)$
$f(t)$ periodic with period s $f(t)$	$\dfrac{1}{1-e^{-sp}}\int_0^s e^{-pt}f(t)\, dt$	convolution $\int_0^t f_1(t-\tau)f_2(\tau)\, d\tau$	$F_1(p)F_2(p)$

SPECIFIC FORMULÆ

$f(t)$	$F(p)$	$f(t)$	$F(p)$
1	$1/p$	t	$1/p^2$
t^n	$n!/p^{n+1}$	$1/\sqrt{\pi t}$	$1/\sqrt{p}$
$2\sqrt{t/\pi}$	$1/\sqrt{p^3}$	$\frac{2^n t^{n-1/2}}{1\cdot3\cdot5\ldots(2n-1)\sqrt{\pi}}$	$p^{-(n+1/2)}$
$t^{k-1} \quad (k>0)$	$\Gamma(k)/p^k$	e^{-at}	$1/(p+a)$
te^{-at}	$1/(p+a)^2$	$t^{n-1}e^{-at}/(n-1)!$	$1/(p+a)^n$
$\frac{e^{-at}-e^{-bt}}{b-a} \quad a \neq b$	$\dfrac{1}{(p+a)(p+b)}$	$\frac{ae^{-at}-be^{-bt}}{a-b} \quad a \neq b$	$\dfrac{p}{(p+a)(p+b)}$
$\frac{1}{a}\sin at$	$1/(p^2+a^2)$	$\cos at$	$p/(p^2+a^2)$
$\dfrac{e^{ct}}{a}\sin at$	$\dfrac{1}{(p-c)^2+a^2}$	$e^{ct}\cos at$	$\dfrac{p-c}{(p-c)^2+a^2}$
$\frac{1}{a}\sinh at$	$1/(p^2-a^2)$	$\cosh at$	$p/(p^2-a^2)$
$a^{-2}(1-\cos at)$	$\dfrac{1}{p(p^2+a^2)}$	$a^{-3}(at-\sin at)$	$\frac{1}{p^2(p^2+a^2)}$
$\delta(t-k)$	e^{-pk}	$u(t-k)$	$\frac{1}{p}e^{-kp}$
$u(t)-u(t-k)$	$\frac{1-e^{-kp}}{p}$	$(t-k)u(t-k)$	$\frac{1}{p^2}e^{-kp}$
$\dfrac{(t-k)^{\mu-1}}{\Gamma(k)}u(t-k)$	$\frac{1}{p^\mu}e^{-kp}, \quad (\mu>0)$	$\dfrac{1}{\sqrt{\pi t}}\exp\left(-\dfrac{k^2}{4t}\right)$	$\dfrac{1}{\sqrt{p}}e^{-k\sqrt{p}}$
$\dfrac{k}{2\sqrt{\pi t^3}}\exp\left(-\dfrac{k^2}{4t}\right)$	$e^{-k\sqrt{p}}, \quad (k>0)$	$\operatorname{erfc}\dfrac{k}{2\sqrt{t}}$	$\dfrac{1}{p}e^{-k\sqrt{p}}$

Here the unit step function (or Heaviside function) is

$$u(x) = 0 \quad \text{if} \quad x < 0, \quad 1 \quad \text{if} \quad x > 0,$$

and the gamma function by

$$\Gamma(x) = \int_0^\infty t^{x-1}e^{-t}dt$$

Note:

$$\Gamma(n+1) = n!, \qquad \operatorname{erfc}(x) = 1 - \operatorname{erf}(x) = \frac{2}{\sqrt{\pi}}\int_x^\infty e^{-\zeta^2}\, d\zeta.$$