Appendix

Exponential function

$e^x e^y = e^{x+y}$

$e^x / e^y = e^{x-y}$

$(e^x)^y = e^{xy}$

$e^{\ln x} = x$

$e^{-\ln x} = e^{\ln(1/x)} = \dfrac{1}{x}$

Natural logarithmic function

$\ln(xy) = \ln x + \ln y$

$\ln(x/y) = \ln x - \ln y$

$\ln(x^a) = a \ln x$

Logarithmic function

$\log_a x = \dfrac{\ln x}{\ln a}$

Trigonometric functions

$\sin(-x) = -\sin x$

$\cos(-x) = \cos x$

$\tan x = \dfrac{\sin x}{\cos x}$, $\cot x = \dfrac{\cos x}{\sin x}$, $\sec x = \dfrac{1}{\cos x}$, $\csc x = \dfrac{1}{\sin x}$

$\sin^2 x + \cos^2 x = 1$

$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$

$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$

$\tan(x \pm y) = \dfrac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$

$\sin x \sin y = \frac{1}{2}\{-\cos(x+y) + \cos(x-y)\}$

$\cos x \cos y = \frac{1}{2}\{\cos(x+y) + \cos(x-y)\}$

$\sin x \cos y = \frac{1}{2}\{\sin(x+y) + \sin(x-y)\}$

$\sin x \pm \sin y = 2 \sin \dfrac{x \pm y}{2} \cos \dfrac{x \mp y}{2}$

$\cos x + \cos y = 2 \cos \dfrac{x+y}{2} \cos \dfrac{x-y}{2}$

$\cos x - \cos y = -2 \sin \dfrac{x+y}{2} \sin \dfrac{x-y}{2}$

$a \sin x + b \cos x = \sqrt{a^2 + b^2} \sin(x + \phi)$

where

$\cos\phi = \dfrac{a}{\sqrt{a^2+b^2}}$, $\sin\phi = \dfrac{b}{\sqrt{a^2+b^2}}$

$e^{\pm ix} = \cos x \pm i \sin x$ (Euler's identities)

Hyperbolic functions

$\sinh x = \frac{1}{2}(e^x - e^{-x})$

$\cosh x = \frac{1}{2}(e^x + e^{-x})$

$\tanh x = \dfrac{\sinh x}{\cosh x}$, $\coth x = \dfrac{\cosh x}{\sinh x}$

$\cosh^2 x - \sinh^2 x = 1$

$\sinh(x \pm y) = \sinh x \cosh y \pm \cosh x \sinh y$

$\cosh(x \pm y) = \cosh x \cosh y \pm \sinh x \sinh y$

$\tanh(x \pm y) = \dfrac{\tanh x \pm \tanh y}{1 \pm \tanh x \tanh y}$

Gamma function

$\Gamma(a) = \int_0^\infty e^{-t} t^{a-1} dt \quad (a > 0)$

$\Gamma(a+1) = a\Gamma(a)$, $\Gamma(k+1) = k! \quad (k = 0, 1, \cdots)$ (Factorial)

$\Gamma(1/2) = \sqrt{\pi}$

Inverse hyperbolic functions (principal values)

$\operatorname{arcsinh} x = \ln(x + \sqrt{x^2+1}) \quad -\infty < x < \infty$

$\operatorname{arccosh} x = \ln(x + \sqrt{x^2-1}) \quad x \ge 1 \quad (\operatorname{arccosh} x > 0)$

$\operatorname{arctanh} x = \dfrac{1}{2}\ln\left(\dfrac{1+x}{1-x}\right) \quad -1 < x < 1$

$\operatorname{arccoth} x = \dfrac{1}{2}\ln\left(\dfrac{x+1}{x-1}\right) \quad x < -1,\ x > 1$

Differentiations

$(cu)' = cu'$ (c constant)

$(u+v)' = u' + v'$

$(uv)' = u'v + v'u$, $(u/v)' = (u'v - v'u)/v^2$

$\dfrac{du}{dx} = \dfrac{du}{dy} \cdot \dfrac{dy}{dx}$ (chain rule)

$(x^n)' = nx^{n-1}$

$(e^x)' = e^x$

$(a^x)' = a^x \ln a$

$(x^x)' = x^x(1 + \ln x) \quad (x > 0,\ x \ne 1)$

Integrations

$\int cu\, dx = c\int u\, dx$ (c constant)

$\int (u+v)\, dx = \int u\, dx + \int v\, dx$

$\int uv' dx = uv - \int u'v\, dx$

$\int_{g(a)}^{g(b)} f(x) dx = \int_a^b f(g(t)) g'(t) dt$ (substitution rule)

$\int x^n dx = \dfrac{x^{n+1}}{n+1} + c \quad (n \ne -1)$

$\int e^{ax} dx = \dfrac{1}{a} e^{ax} + c$

$\int a^x dx = \dfrac{a^x}{\ln a} + c$

$\int \ln x\, dx = x \ln x - x + c$

$(\ln x)' = \frac{1}{x}$

$(\log_a x)' = \frac{\log_a e}{x}$

$(\sin x)' = \cos x$

$(\cos x)' = -\sin x$

$(\tan x)' = \sec^2 x = 1/\cos^2 x$

$(\cot x)' = -\csc^2 x = -1/\sin^2 x$

$(\sec x)' = \sec x \tan x = \sin x/\cos^2 x$

$(\csc x)' = -\csc x \cot x = -\cos x/\sin^2 x$

$(\sinh x)' = \cosh x$

$(\cosh x)' = \sinh x$

$(\tanh x)' = 1/\cosh^2 x$

$(\coth x)' = -1/\sinh^2 x$

$(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$

$(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$

$(\arctan x)' = \frac{1}{1+x^2}$

$(\text{arccot}\, x)' = -\frac{1}{1+x^2}$

$(\text{arcsinh}\, x)' = \frac{1}{\sqrt{1+x^2}}$

$(\text{arccosh}\, x)' = \frac{1}{\sqrt{x^2-1}}$

$(\text{arctanh}\, x)' = \frac{1}{1-x^2}$

$(\text{arccoth}\, x)' = \frac{1}{1-x^2}$

Maclaurin series (Taylor series with center $z_0 = 0$)

$$\cos x = \sum_{m=0}^{\infty} \frac{(-1)^m x^{2m}}{(2m)!} = 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \cdots$$

$$\sin x = \sum_{m=0}^{\infty} \frac{(-1)^m x^{2m+1}}{(2m+1)!} = x - \frac{1}{3!}x^3 + \frac{1}{5!}x^5 - \cdots$$

$$e^x = \sum_{m=0}^{\infty} \frac{x^m}{m!} = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \cdots$$

$$\frac{1}{1-x} = \sum_{m=0}^{\infty} x^m = 1 + x + x^2 + \cdots \quad (|x|<1)$$

$$\ln(1-x) = -\sum_{m=1}^{\infty} \frac{x^m}{m} = -x - \frac{1}{2}x^2 - \frac{1}{3}x^3 - \cdots \quad (|x|<1)$$

$$\arctan x = \sum_{m=0}^{\infty} \frac{(-1)^m x^{2m+1}}{2m+1} = x - \frac{1}{3}x^3 + \frac{1}{5}x^5 - \cdots \quad (|x|<1)$$

$\int \frac{1}{x} dx = \ln|x| + c$

$\int \log_a x\, dx = \frac{x\ln x - x}{\ln a} + c$

$\int \sin x\, dx = -\cos x + c$

$\int \cos x\, dx = \sin x + c$

$\int \tan x\, dx = -\ln|\cos x| + c$

$\int \cot x\, dx = \ln|\sin x| + c$

$\int \sec x\, dx = \ln|\sec x + \tan x| + c$

$\int \csc x\, dx = \ln|\csc x - \cot x| + c$

$\int \sinh x\, dx = \cosh x + c$

$\int \cosh x\, dx = \sinh x + c$

$\int \tanh x\, dx = \ln|\cosh x| + c$

$\int \coth x\, dx = \ln|\sinh x| + c$

$\int \frac{1}{\sqrt{a^2-x^2}} dx = \arcsin\frac{x}{a} + c$

$\int \sqrt{a^2-x^2}\, dx = \frac{1}{2}\left\{x\sqrt{a^2-x^2} + a^2 \arcsin\frac{x}{a}\right\} + c$

$\int \frac{1}{x^2+a^2} dx = \frac{1}{a}\arctan\frac{x}{a} + c$

$\int \sqrt{x^2+a^2}\, dx = \frac{1}{2}\left\{x\sqrt{x^2+a^2} + a^2 \ln\left(x + \sqrt{x^2+a^2}\right)\right\} + c$

$\int \frac{1}{\sqrt{x^2+a^2}} dx = \text{arcsinh}\frac{x}{a} + c = \ln\left(x + \sqrt{x^2+a^2}\right) + c$

$\int \frac{1}{\sqrt{x^2-a^2}} dx = \text{arccosh}\frac{x}{a} + c = \ln\left(x + \sqrt{x^2-a^2}\right) + c$

$\int \frac{1}{a^2-x^2} dx = \frac{1}{2a}\ln\left|\frac{x+a}{x-a}\right| + c = \frac{1}{a}\text{arctanh}\frac{x}{a} + c$

$\int \sqrt{x^2-a^2}\, dx = \frac{1}{2}\left\{x\sqrt{x^2-a^2} - a^2 \ln\left(x + \sqrt{x^2-a^2}\right)\right\} + c$

$\int \sin^2 x\, dx = \frac{1}{2}x - \frac{1}{4}\sin 2x + c$, $\int \frac{1}{\sin^2 x} dx = -\frac{1}{\tan x} + c$

$\int \cos^2 x\, dx = \frac{1}{2}x + \frac{1}{4}\sin 2x + c$, $\int \frac{1}{\cos^2 x} dx = \tan x + c$

$\int \tan^2 x\, dx = \tan x - x + c$, $\int \cot^2 x\, dx = -\cot x - x + c$

$\int e^{ax} \sin bx\, dx = \frac{e^{ax}}{a^2+b^2}(a\sin bx - b\cos bx) + c$

$\int e^{ax} \cos bx\, dx = \frac{e^{ax}}{a^2+b^2}(a\cos bx + b\sin bx) + c$

Growth rate

$\lim_{x\to\infty} \frac{\ln x}{x^n} = 0 \quad (n>0)$, $\lim_{x\to\infty} \frac{x^n}{a^x} = 0 \quad (a>1)$

$\lim_{x\to\infty} \frac{a^x}{x!} = 0$, $\lim_{x\to\infty} \frac{x!}{x^x} = 0$

Table of Laplace Transforms

$f(t)$	$F(s)$	$f(t)$	$F(s)$	$f(t)$	$F(s)$
$\delta(t)$	1	$\cos\omega t$	$\dfrac{s}{s^2+\omega^2}$	$\sin\omega t$	$\dfrac{\omega}{s^2+\omega^2}$
$1,\ \ u(t)$	$\dfrac{1}{s}$	$e^{at}\cos\omega t$	$\dfrac{s-a}{(s-a)^2+\omega^2}$	$e^{at}\sin\omega t$	$\dfrac{\omega}{(s-a)^2+\omega^2}$
t^n $(n=0,1,2,\cdots)$	$\dfrac{n!}{s^{n+1}}$	$\cos(\omega t+\theta)$	$\dfrac{s\cos\theta-\omega\sin\theta}{s^2+\omega^2}$	$\sin(\omega t+\theta)$	$\dfrac{s\sin\theta+\omega\cos\theta}{s^2+\omega^2}$
e^{at}	$\dfrac{1}{s-a}$	$\cos^2\omega t$	$\dfrac{s^2+2\omega^2}{s(s^2+4\omega^2)}$	$\sin^2\omega t$	$\dfrac{2\omega^2}{s(s^2+4\omega^2)}$
$e^{at}t^n$ $(n=0,1,2,\cdots)$	$\dfrac{n!}{(s-a)^{n+1}}$	$\cosh at$ $=\dfrac{e^{at}+e^{-at}}{2}$	$\dfrac{s}{s^2-a^2}$	$\sinh at$ $=\dfrac{e^{at}-e^{-at}}{2}$	$\dfrac{a}{s^2-a^2}$
t^a $(a>-1)$	$\dfrac{\Gamma(a+1)}{s^{a+1}}$	$\cosh^2 at$	$\dfrac{s^2-2a^2}{s(s^2-4a^2)}$	$\sinh^2 at$	$\dfrac{2a^2}{s(s^2-4a^2)}$
$2\sqrt{\dfrac{t}{\pi}}$	$\dfrac{1}{s^{3/2}}$	$t\cos\omega t$	$\dfrac{s^2-\omega^2}{(s^2+\omega^2)^2}$	$t\sin\omega t$	$\dfrac{2\omega s}{(s^2+\omega^2)^2}$
$\dfrac{1}{\sqrt{\pi t}}$	$\dfrac{1}{\sqrt{s}}$	$t\cos^2\omega t$	$\dfrac{s^4+2\omega^2 s^2+8\omega^4}{s^2(s^2+4\omega^2)^2}$	$t\sin^2\omega t$	$\dfrac{2\omega^2(3s^2+4\omega^2)}{s^2(s^2+4\omega^2)^2}$
$\dfrac{e^{bt}-e^{at}}{2\sqrt{\pi t^3}}$	$\sqrt{s-a}-\sqrt{s-b}$	$t^2\cos\omega t$	$\dfrac{2s(s^2-3\omega^2)}{(s^2+\omega^2)^3}$	$t^2\sin\omega t$	$\dfrac{2\omega(3s^2-\omega^2)}{(s^2+\omega^2)^3}$
$\ln t$	$-\dfrac{\gamma+\ln s}{s}$	$\dfrac{2}{t}(1-\cos\omega t)$	$\ln\dfrac{s^2+\omega^2}{s^2}$	$\dfrac{1}{t}\sin\omega t$	$\arctan\dfrac{\omega}{s}$
$\dfrac{1}{t}\left(e^{bt}-e^{at}\right)$	$\ln\dfrac{s-a}{s-b}$	$\dfrac{2}{t}(1-\cosh at)$	$\ln\dfrac{s^2-a^2}{s^2}$	$\dfrac{1}{t}\sinh at$	$\operatorname{arctanh}\dfrac{a}{s}$ $\left(=\dfrac{1}{2}\ln\dfrac{s+a}{s-a}\right)$
$\dfrac{k}{2\sqrt{\pi t^3}}e^{-\frac{k^2}{4t}}$ $(k>0)$	$e^{-k\sqrt{s}}$	$\lvert\cos\omega t\rvert$	$\dfrac{s+\omega\operatorname{csch}\dfrac{\pi s}{2\omega}}{s^2+\omega^2}$ $=\dfrac{s(e^{\frac{\pi s}{\omega}}-1)+2e^{\frac{\pi s}{2\omega}}\omega}{(e^{\frac{\pi s}{\omega}}-1)(s^2+\omega^2)}$	$\lvert\sin\omega t\rvert$	$\dfrac{\omega\coth\dfrac{\pi s}{2\omega}}{s^2+\omega^2}$ $=\dfrac{\omega(e^{\frac{\pi s}{\omega}}+1)}{(e^{\frac{\pi s}{\omega}}-1)(s^2+\omega^2)}$
$\dfrac{1}{\sqrt{\pi t}}e^{-\frac{k^2}{4t}}$ $(k>0)$	$\dfrac{e^{-k\sqrt{s}}}{\sqrt{s}}$	$\dfrac{\cos 2\sqrt{kt}}{\sqrt{\pi t}}$	$\dfrac{e^{-k/s}}{\sqrt{s}}$	$\dfrac{\sin 2\sqrt{kt}}{\sqrt{\pi k}}$	$\dfrac{e^{-k/s}}{s^{3/2}}$
$\dfrac{2k}{\sqrt{\pi}}e^{-k^2t^2}$ $(k>0)$	$e^{\frac{s^2}{4k^2}}\operatorname{erfc}\left(\dfrac{s}{2k}\right)$	$\dfrac{\cos 2\sqrt{kt}}{2\sqrt{\pi t^3}}$ (*)	$-\sqrt{s}e^{-k/s}$ $-\sqrt{\pi k}\operatorname{erf}\left(\sqrt{k/s}\right)$	$\dfrac{\sin 2\sqrt{kt}}{\pi t}$	$\operatorname{erf}\left(\sqrt{k/s}\right)$
$\dfrac{1}{k}e^{-\frac{k^2}{4t}}$ $(k>0)$	$\dfrac{K_1\left(k\sqrt{s}\right)}{\sqrt{s}}$	$\dfrac{\cosh 2\sqrt{kt}}{\sqrt{\pi t}}$	$\dfrac{e^{k/s}}{\sqrt{s}}$	$\dfrac{\sinh 2\sqrt{kt}}{\sqrt{\pi k}}$	$\dfrac{e^{k/s}}{s^{3/2}}$
$\dfrac{1}{2t}e^{-\frac{k^2}{4t}}$ $(k>0)$	$K_0\left(k\sqrt{s}\right)$	$J_0(at)$	$\dfrac{1}{\sqrt{s^2+a^2}}$	$I_0(at)$	$\dfrac{1}{\sqrt{s^2-a^2}}$

$\mathrm{erf}\,(\sqrt{t})$	$\dfrac{1}{s\sqrt{s+1}}$	$Y_0(at)$	$\dfrac{-2\,\mathrm{arcsinh}\,\frac{s}{a}}{\pi\sqrt{s^2+a^2}}$	$K_0(at)$	$\dfrac{\mathrm{arccosh}\,\frac{s}{a}}{\sqrt{s^2-a^2}}$
$\mathrm{erfc}(\sqrt{t})$	$\dfrac{1}{s+1+\sqrt{s+1}}$ $=\dfrac{\sqrt{s+1}-1}{s\sqrt{s+1}}$	$J_n(at)$	$\dfrac{a^n(s+\sqrt{s^2+a^2})^{-n}}{\sqrt{s^2+a^2}}$	$I_n(at)$	$\dfrac{a^n(s+\sqrt{s^2-a^2})^{-n}}{\sqrt{s^2-a^2}}$
$e^t\,\mathrm{erf}\,(\sqrt{t})$	$\dfrac{1}{\sqrt{s}(s-1)}$	$\dfrac{1}{t}J_n(at)$ $(n\neq 0)$	$\dfrac{a^n(s+\sqrt{s^2+a^2})^{-n}}{n}$	$\dfrac{1}{t}I_n(at)$ $(n\neq 0)$	$\dfrac{a^n(s+\sqrt{s^2-a^2})^{-n}}{n}$
$e^t\,\mathrm{erfc}(\sqrt{t})$	$\dfrac{1}{\sqrt{s}+s}$	$t^n J_n(at)$ $(n>-1/2)$	$\dfrac{(2a)^n\Gamma\left(n+\frac{1}{2}\right)}{\sqrt{\pi}(s^2+a^2)^{n+\frac{1}{2}}}$	$t^n I_n(at)$ $(n>-1/2)$	$\dfrac{(2a)^n\Gamma\left(n+\frac{1}{2}\right)}{\sqrt{\pi}(s^2-a^2)^{n+\frac{1}{2}}}$
$\mathrm{erf}\left(\dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{1-e^{-a\sqrt{s}}}{s}$	$J_0(2\sqrt{kt})$	$\dfrac{1}{s}e^{-k/s}$	$I_0(2\sqrt{kt})$	$\dfrac{1}{s}e^{k/s}$
$\mathrm{erfc}\left(\dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{1}{s}e^{-a\sqrt{s}}$	$J_0(a\sqrt{t^2-b^2})$ $(t>b)$	$\dfrac{e^{-b\sqrt{s^2+a^2}}}{\sqrt{s^2+a^2}}$	$J_0(a\sqrt{t^2+2bt})$	$\dfrac{e^{b(s-\sqrt{s^2+a^2})}}{\sqrt{s^2+a^2}}$
$\mathrm{Ei}(at)$	$\dfrac{1}{s}\ln\dfrac{s+a}{a}$	$\mathrm{Si}(at)$	$\dfrac{1}{s}\arctan\dfrac{a}{s}$	$\mathrm{ci}(at)$	$\dfrac{1}{2s}\ln\dfrac{s^2+a^2}{a^2}$

Euler constant

$$\gamma=\lim_{n\to\infty}\left(1+\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{n}-\ln n\right)=0.57721566490153286060651209008240243104215933593992\cdots$$

Gamma function

$$\Gamma(a)=\int_0^\infty e^{-t}t^{a-1}dt\quad(a>0)\,,\quad\Gamma(a+1)=a\Gamma(a)\,,\quad\Gamma(k+1)=k!\quad(k=0,1,\cdots)\,,\quad\Gamma(1/2)=\sqrt{\pi}$$

Error function and complementary error function

$$\mathrm{erf}\,(x)=\frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}dt\,,\quad\mathrm{erfc}(x)=1-\mathrm{erf}\,(x)=\frac{2}{\sqrt{\pi}}\int_x^\infty e^{-t^2}dt$$

Sine integral and cosine integral

$$\mathrm{Si}(x)=\int_0^x\frac{\sin t}{t}dt\,,\quad\mathrm{si}(x)=\frac{\pi}{2}-\mathrm{Si}\,(x)=\int_x^\infty\frac{\sin t}{t}dt\,,\quad\mathrm{ci}(x)=\int_x^\infty\frac{\cos t}{t}dt$$

Exponential integral and logarithmic integral

$$\mathrm{Ei}(x)=\int_x^\infty\frac{e^{-t}}{t}dt\,,\quad\mathrm{li}(x)=\int_0^x\frac{dt}{\ln t}$$

Fresnel integrals

$$\mathrm{S}(x)=\int_0^x\sin(t^2)\,dt\,,\quad\mathrm{C}(x)=\int_0^x\cos(t^2)\,dt$$

Bessel functions

Solutions of the differential equation $x^2y''+xy'+(x^2-\nu^2)y=0\quad(\nu\geq 0)$

$$J_\nu(x)=\sum_{m=0}^\infty\frac{(-1)^m x^{2m+\nu}}{2^{2m+\nu}m!\Gamma(\nu+m+1)}\,,$$

$$Y_\nu(x)=\frac{1}{\sin\nu\pi}\left[J_\nu(x)\cos\nu\pi-J_{-\nu}(x)\right]$$

$$Y_n(x)=\lim_{\nu\to n}Y_\nu(x)\quad(n=0,1,2,\cdots)$$

Modified Bessel functions

Solutions of the differential equation $x^2y''+xy'-(x^2+\nu^2)y=0\quad(\nu\geq 0)$

$$I_\nu(x)=i^{-\nu}J_\nu(ix)=\sum_{m=0}^\infty\frac{x^{2m+\nu}}{2^{2m+\nu}m!\Gamma(\nu+m+1)}\,,$$

$$K_\nu(x)=\frac{\pi}{2\sin\nu\pi}\left[I_{-\nu}(x)-I_\nu(x)\right]$$

$$K_n(x)=\lim_{\nu\to n}K_\nu(x)\quad(n=0,1,2,\cdots)$$

Table of Inverse Laplace Transforms

$F(s)$	$f(t)$	$F(s)$	$f(t)$	$F(s)$	$f(t)$
1	$\delta(t)$	e^{as}	$\delta(t-a)$	$\dfrac{1}{s^2+\omega^2}$	$\dfrac{1}{\omega}\sin\omega t$
$\dfrac{1}{s}$	$1,\ \ u(t)$	$\dfrac{1}{s-a}$	e^{at}	$\dfrac{s}{s^2+\omega^2}$	$\cos\omega t$
$\dfrac{1}{s^n}$ $(n=1,2,\cdots)$	$\dfrac{t^{n-1}}{(n-1)!}$	$\dfrac{1}{(s-a)^n}$ $(n=1,2,\cdots)$	$\dfrac{e^{at}t^{n-1}}{(n-1)!}$	$\dfrac{1}{s^2-a^2}$	$\dfrac{1}{a}\sinh at$
$\dfrac{1}{s^a}$ $(a>0)$	$\dfrac{t^{a-1}}{\Gamma(a)}$	$\dfrac{1}{(s-a)^k}$ $(k>0)$	$\dfrac{e^{at}t^{k-1}}{\Gamma(k)}$	$\dfrac{s}{s^2-a^2}$	$\cosh at$
$\dfrac{1}{\sqrt{s}}$	$\dfrac{1}{\sqrt{\pi t}}$	$\dfrac{1}{(s-a)(s-b)}$ $(a\neq b)$	$\dfrac{e^{at}-e^{bt}}{a-b}$	$\dfrac{1}{(s-a)^2+\omega^2}$	$\dfrac{1}{\omega}e^{at}\sin\omega t$
$\dfrac{1}{s^{3/2}}$	$2\sqrt{\dfrac{t}{\pi}}$	$\dfrac{s}{(s-a)(s-b)}$ $(a\neq b)$	$\dfrac{ae^{at}-be^{bt}}{a-b}$	$\dfrac{s-a}{(s-a)^2+\omega^2}$	$e^{at}\cos\omega t$
$\sqrt{s-a}-\sqrt{s-b}$	$\dfrac{e^{bt}-e^{at}}{2\sqrt{\pi t^3}}$	$\dfrac{1}{(s^2+a^2)(s^2+b^2)}$ $(a\neq b)$	$\dfrac{b\sin at-a\sin bt}{ab(b^2-a^2)}$	$\dfrac{1}{s(s^2+\omega^2)}$	$\dfrac{1}{\omega^2}(1-\cos\omega t)$
$\dfrac{1}{\sqrt{s+a}\sqrt{s+b}}$	$e^{\frac{-(a+b)t}{2}}\times I_0\left(\dfrac{a-b}{2}t\right)$	$\dfrac{s}{(s^2+a^2)(s^2+b^2)}$ $(a\neq b)$	$\dfrac{\cos at-\cos bt}{b^2-a^2}$	$\dfrac{1}{s^2(s^2+\omega^2)}$	$\dfrac{1}{\omega^3}(\omega t-\sin\omega t)$
$\dfrac{1}{\sqrt{s^2+a^2}}$	$J_0(at)$	$\dfrac{1}{s^4+4k^4}$	$\dfrac{1}{4k^3}\left(\sin kt\cosh kt-\cos kt\sinh kt\right)$	$\dfrac{1}{(s^2+\omega^2)^2}$	$\dfrac{\sin\omega t-\omega t\cos\omega t}{2\omega^3}$
$\dfrac{s}{(s-a)^{3/2}}$	$\dfrac{e^{at}(1+2at)}{\sqrt{\pi t}}$	$\dfrac{s}{s^4+4k^4}$	$\dfrac{1}{2k^2}\sin kt\sinh kt$	$\dfrac{s}{(s^2+\omega^2)^2}$	$\dfrac{t\sin\omega t}{2\omega}$
$\dfrac{1}{\sqrt{s^2-a^2}}$	$I_0(at)$	$\dfrac{1}{s^4-k^4}$	$\dfrac{1}{2k^3}(\sinh kt-\sin kt)$	$\dfrac{s^2}{(s^2+\omega^2)^2}$	$\dfrac{\sin\omega t+\omega t\cos\omega t}{2\omega}$
$\dfrac{1}{(s^2-a^2)^k}$ $(k>0)$	$\dfrac{\sqrt{\pi}}{\Gamma(k)}\left(\dfrac{t}{2a}\right)^{k-\frac{1}{2}}\times I_{k-1/2}(at)$	$\dfrac{s}{s^4-k^4}$	$\dfrac{1}{2k^2}(\cosh kt-\cos kt)$	$\dfrac{s^3}{(s^2+\omega^2)^2}$	$\cos\omega t-\dfrac{1}{2}\omega t\sin\omega t$
$\dfrac{1}{s}e^{-k/s}$	$J_0(2\sqrt{kt})$	$\dfrac{1}{s}e^{k/s}$	$I_0(2\sqrt{kt})$	$\dfrac{\ln s}{s}$	$-\ln t-\gamma$
$\dfrac{e^{-k/s}}{\sqrt{s}}$	$\dfrac{\cos 2\sqrt{kt}}{\sqrt{\pi t}}$	$\dfrac{e^{k/s}}{\sqrt{s}}$	$\dfrac{\cosh 2\sqrt{kt}}{\sqrt{\pi t}}$	$\ln\dfrac{s-a}{s-b}$	$\dfrac{1}{t}\left(e^{bt}-e^{at}\right)$
$\dfrac{e^{-k/s}}{s^{3/2}}$	$\dfrac{\sin 2\sqrt{kt}}{\sqrt{\pi k}}$	$\dfrac{e^{k/s}}{s^{3/2}}$	$\dfrac{\sinh 2\sqrt{kt}}{\sqrt{\pi k}}$	$\ln\dfrac{s^2+\omega^2}{s^2}$	$\dfrac{2}{t}\left(1-\cos\omega t\right)$
$e^{-k\sqrt{s}}$ $(k>0)$	$\dfrac{k}{2\sqrt{\pi t^3}}e^{-\frac{k^2}{4t}}$	$\arctan\dfrac{\omega}{s}$	$\dfrac{1}{t}\sin\omega t$	$\ln\dfrac{s^2-a^2}{s^2}$	$\dfrac{2}{t}\left(1-\cosh at\right)$
$\dfrac{e^{-k\sqrt{s}}}{\sqrt{s}}$ $(k>0)$	$\dfrac{1}{\sqrt{\pi t}}e^{-\frac{k^2}{4t}}$	$\dfrac{1}{s}\arctan\dfrac{\omega}{s}$	$\mathrm{Si}(\omega t)$	$\ln\dfrac{s^2+\omega^2}{s^2-a^2}$	$\dfrac{2}{t}\left(\cosh at-\cos\omega t\right)$