

TABLE OF LAPLACE TRANSFORMS

	$F(s) = \mathcal{L}\{f(t)\}$	$f(t)$
1	$1/s$	1
2	$1/s^2$	t
3	$1/s^n \quad (n = 1, 2, \dots)$	$t^{n-1}/(n-1)!$
4	$1/\sqrt{s}$	$1/\sqrt{\pi t}$
5	$1/s^{3/2}$	$2\sqrt{t/\pi}$
6	$1/s^a \quad (a > 0)$	$t^{a-1}/\Gamma(a)$
7	$\frac{1}{s-a}$	e^{at}
8	$\frac{1}{(s-a)^2}$	te^{at}
9	$\frac{1}{(s-a)^n} \quad (n = 1, 2, \dots)$	$\frac{1}{(n-1)!} t^{n-1} e^{at}$
10	$\frac{1}{(s-a)^k} \quad (k > 0)$	$\frac{1}{\Gamma(k)} t^{k-1} e^{at}$
11	$\frac{1}{(s-a)(s-b)} \quad (a \neq b)$	$\frac{1}{a-b} (e^{at} - e^{bt})$
12	$\frac{s}{(s-a)(s-b)} \quad (a \neq b)$	$\frac{1}{a-b} (ae^{at} - be^{bt})$
13	$\frac{1}{s^2 + \omega^2}$	$\frac{1}{\omega} \sin \omega t$
14	$\frac{s}{s^2 + \omega^2}$	$\cos \omega t$
15	$\frac{1}{s^2 - a^2}$	$\frac{1}{a} \sinh at$
16	$\frac{s}{s^2 - a^2}$	$\cosh at$
17	$\frac{1}{(s-a)^2 + \omega^2}$	$\frac{1}{\omega} e^{at} \sinh \omega t$
18	$\frac{s-a}{(s-a)^2 + \omega^2}$	$e^{at} \cos \omega t$
19	$\frac{1}{s(s^2 + \omega^2)}$	$\frac{1}{\omega^2} (1 - \cos \omega t)$
20	$\frac{1}{s^2(s^2 + \omega^2)}$	$\frac{1}{\omega^3} (\omega t - \sin \omega t)$

Table of Laplace Transforms (continued)

	$F(s) = \mathcal{L}\{f(t)\}$	$f(t)$
21	$\frac{1}{(s^2 + \omega^2)^2}$	$\frac{1}{2\omega^3}(\sin \omega t - \omega t \cos \omega t)$
22	$\frac{s}{(s^2 + \omega^2)^2}$	$\frac{t}{2\omega} \sin \omega t$
23	$\frac{s^2}{(s^2 + \omega^2)^2}$	$\frac{1}{2\omega}(\sin \omega t + \omega t \cos \omega t)$
24	$\frac{s}{(s^2 + a^2)(s^2 + b^2)} \quad (a^2 \neq b^2)$	$\frac{1}{b^2 - a^2}(\cos at - \cos bt)$
25	$\frac{1}{s^4 + 4k^4}$	$\frac{1}{4k^3}(\sin kt \cos kt - \cos kt \sinh kt)$
26	$\frac{s}{s^4 + 4k^4}$	$\frac{1}{2k^2} \sin kt \sinh kt$
27	$\frac{1}{s^4 - k^4}$	$\frac{1}{2k^3}(\sinh kt - \sin kt)$
28	$\frac{s}{s^4 - k^4}$	$\frac{1}{2k^2}(\cosh kt - \cos kt)$
29	$\sqrt{s-a} - \sqrt{s-b}$	$\frac{1}{2\sqrt{\pi t^3}}(e^{bt} - e^{at})$
30	$\frac{1}{\sqrt{s+a}\sqrt{s+b}}$	$e^{-(a+b)t/2} I_0\left(\frac{a-b}{2}t\right)$
31	$\frac{1}{\sqrt{s^2 + a^2}}$	$J_0(at)$
32	$\frac{s}{(s-a)^{3/2}}$	$\frac{1}{\sqrt{\pi t}} e^{at}(1 + 2at)$
33	$\frac{1}{(s^2 - a^2)^k} \quad (k > 0)$	$\frac{\sqrt{\pi}}{\Gamma(k)} \left(\frac{t}{2a}\right)^{k-1/2} I_{k-1/2}(at)$
34	e^{-as}/s	$u(t-a)$
35	e^{-as}	$\delta(t-a)$
36	$\frac{1}{s} e^{-k/s}$	$J_0(2\sqrt{kt})$
37	$\frac{1}{\sqrt{s}} e^{-k/s}$	$\frac{1}{\sqrt{\pi t}} \cos 2\sqrt{kt}$
38	$\frac{1}{s^{3/2}} e^{k/s}$	$\frac{1}{\sqrt{\pi k}} \sinh 2\sqrt{kt}$
39	$e^{-k\sqrt{s}} \quad (k > 0)$	$\frac{k}{2\sqrt{\pi t^3}} e^{-k^2/4t}$

Table of Laplace Transforms (*continued*)

	$F(s) = \mathcal{L}\{f(t)\}$	$f(t)$
40	$\frac{1}{s} \ln s$	$-\ln t - \gamma \quad (\gamma \approx 0.5772)$
41	$\ln \frac{s-a}{s-b}$	$\frac{1}{t}(e^{bt} - e^{at})$
42	$\ln \frac{s^2 + \omega^2}{s^2}$	$\frac{2}{t}(1 - \cos \omega t)$
43	$\ln \frac{s^2 - a^2}{s^2}$	$\frac{2}{t}(1 - \cosh at)$
44	$\arctan \frac{\omega}{s}$	$\frac{1}{t} \sin \omega t$
45	$\frac{1}{s} \operatorname{arccot} s$	$\operatorname{Si}(t)$

Reference :

Kreyszig, Erwin, Kreyszig, Herbert and Norminton, E. J.
Advanced Engineering Mathematics, 10th Edition.
Hoboken, NJ: Wiley, 2011.