

Laplace Transformations
Formula Sheet

Transform Number	$f(t)$	$\mathcal{L}[f(t)] = F(s)$
1	$f(t)$	$\int_0^{\infty} e^{-st} f(t) dt$
2	$f'(t)$	$sF(s) - f(0)$
3	$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
4	$a g(t) + b h(t) + \dots$	$aG(s) + bH(s) + \dots$
5	1	$\frac{1}{s}$
6	t	$\frac{1}{s^2}$
7	t^n	$\frac{n!}{s^{n+1}}$
8	$\frac{t^{n-1}}{(n-1)!}$	$\frac{1}{s^n}$
9	e^{at}	$\frac{1}{s-a}$
10	$1 - e^{-at}$	$\frac{1}{s-a}$
11	te^{at}	$\frac{1}{(s-a)^2}$
12	$e^{at}(1 + at)$	$\frac{s}{(s-a)^2}$
13	$t^n e^{at}$	$\frac{n!}{(s-a)^{n+1}}$
14	$t^{n-1} e^{-at}$	$\frac{(n-1)!}{(s+a)^n}$
15	$e^{-at} - e^{-bt}$	$\frac{b-a}{(s+a)(s+b)}$
16	$ae^{-at} - be^{-bt}$	$\frac{s(a-b)}{(s+a)(s+b)}$
17	$\sin(at)$	$\frac{a}{s^2+a^2}$
18	$\cos(at)$	$\frac{s}{s^2+a^2}$
19	$t\sin(at)$	$\frac{2as}{(s^2+a^2)^2}$
20	$t\cos(at)$	$\frac{s^2-a^2}{(s^2+a^2)^2}$
21	$1 - \cos(at)$	$\frac{a^2}{s(s^2+a^2)}$
22	$at - \sin(at)$	$\frac{a^3}{s^2(s^2+a^2)}$
23	$e^{-at}\sin(bt)$	$\frac{b}{(s+a)^2+b^2}$
24	$e^{-at}\cos(bt)$	$\frac{s+a}{(s+a)^2+b^2}$
25	$\sin(at) - at\cos(at)$	$\frac{2a^3}{(s^2+a^2)^2}$
26	$\sin(at) + at\cos(at)$	$\frac{2as^2}{(s^2+a^2)^2}$
27	$\cos(at) - \frac{1}{2}at\sin(at)$	$\frac{s^3}{(s^2+a^2)^2}$
28	$\frac{b}{a^2}(e^{-at} + at - 1)$	$\frac{b}{s^2(s+a)}$
29	$\int_0^t f(t)$	$\frac{F(s)}{s}$



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