

Section 4-10 : Table Of Laplace Transforms

$f(t) = \mathcal{L}^{-1}\{F(s)\}$	$F(s) = \mathcal{L}\{f(t)\}$
1. 1	$\frac{1}{s}$
2. e^{at}	$\frac{1}{s-a}$
3. $t^n, n=1,2,3,\dots$	$\frac{n!}{s^{n+1}}$
4. $t^p, p > -1$	$\frac{\Gamma(p+1)}{s^{p+1}}$
5. $\sqrt{t}$	$\frac{\sqrt{\pi}}{2s^{\frac{3}{2}}}$
6. $t^{n-\frac{1}{2}}, n=1,2,3,\dots$	$\frac{1 \cdot 3 \cdot 5 \cdots (2n-1)\sqrt{\pi}}{2^n s^{n+\frac{1}{2}}}$
7. $\sin(at)$	$\frac{a}{s^2+a^2}$
8. $\cos(at)$	$\frac{s}{s^2+a^2}$
9. $t \sin(at)$	$\frac{2as}{(s^2+a^2)^2}$
10. $t \cos(at)$	$\frac{s^2-a^2}{(s^2+a^2)^2}$
11. $\sin(at) - at \cos(at)$	$\frac{2a^3}{(s^2+a^2)^2}$
12. $\sin(at) + at \cos(at)$	$\frac{2as^2}{(s^2+a^2)^2}$
13. $\cos(at) - at \sin(at)$	$\frac{s(s^2-a^2)}{(s^2+a^2)^2}$
14. $\cos(at) + at \sin(at)$	$\frac{s(s^2+3a^2)}{(s^2+a^2)^2}$
15. $\sin(at+b)$	$\frac{s \sin(b) + a \cos(b)}{s^2+a^2}$
16. $\cos(at+b)$	$\frac{s \cos(b) - a \sin(b)}{s^2+a^2}$

17.	$\sinh(at)$	$\frac{a}{s^2 - a^2}$
18.	$\cosh(at)$	$\frac{s}{s^2 - a^2}$
19.	$e^{at} \sin(bt)$	$\frac{b}{(s-a)^2 + b^2}$
20.	$e^{at} \cos(bt)$	$\frac{s-a}{(s-a)^2 + b^2}$
21.	$e^{at} \sinh(bt)$	$\frac{b}{(s-a)^2 - b^2}$
22.	$e^{at} \cosh(bt)$	$\frac{s-a}{(s-a)^2 - b^2}$
23.	$t^n e^{at}, \quad n=1, 2, 3, \dots$	$\frac{n!}{(s-a)^{n+1}}$
24.	$f(ct)$	$\frac{1}{c} F\left(\frac{s}{c}\right)$
25.	$u_c(t) = u(t-c)$ Heaviside Function	$\frac{e^{-cs}}{s}$
26.	$\delta(t-c)$ Dirac Delta Function	e^{-cs}
27.	$u_c(t) f(t-c)$	$e^{-cs} F(s)$
28.	$u_c(t) g(t)$	$e^{-cs} \mathcal{L}\{g(t+c)\}$
29.	$e^{ct} f(t)$	$F(s-c)$
30.	$t^n f(t), \quad n=1, 2, 3, \dots$	$(-1)^n F^{(n)}(s)$
31.	$\frac{1}{t} f(t)$	$\int_s^\infty F(u) du$
32.	$\int_0^t f(v) dv$	$\frac{F(s)}{s}$
33.	$\int_0^t f(t-\tau) g(\tau) d\tau$	$F(s)G(s)$
34.	$f(t+T) = f(t)$	$\frac{\int_0^T e^{-st} f(t) dt}{1 - e^{-sT}}$
35.	$f'(t)$	$sF(s) - f(0)$
36.	$f''(t)$	$s^2 F(s) - sf(0) - f'(0)$
37.	$f^{(n)}(t)$	$s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \dots - sf^{(n-2)}(0) - f^{(n-1)}(0)$