



ADDITIONAL RESOURCES:
LAPLACE TRANSFORM TABLE

This table lists some of the important Laplace Transforms. These can be used to solve differential equations and to convert from the time domain to 's' domain and vice versa.

No.	Time function, $f(t)$	Laplace transform, $F(s)$
1	Unit step, 1	$1/s$
2	Constant function, A	A/s
3	Unit impulse, $\delta(t)$	1
4	Ramp, t	$1/s^2$
5	t^n , n is a positive integer (n=1, 2, 3, ...)	$n!/s^{n+1}$
6	e^{-at}	$1/(s+a)$
7	$(1/T)e^{-t/T}$	$1/(Ts+1)$
8	te^{-at}	$1/(s+a)^2$
9	$t^n e^{-at}$	$n!/(s+a)^{n+1}$
10	Derivative: df/dt	$sF(s) - f(0)$
11	Nth order derivative: $d^n f/dt^n$	$s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \dots - s f^{(n-2)}(0) - f^{(n-1)}(0)$
12	Integrals: $\int_0^t f(t) dt$	$F(s)/s$
13	$1 - e^{-t/T}$	$1/\{s(Ts+1)\}$
14	$\sin at$	$a/(s^2+a^2)$
15	$\cos at$	$s/(s^2+a^2)$
16	$\sin (at + \emptyset)$	$(a \cos \emptyset + s \sin \emptyset)/(s^2 + a^2)$



No.	Time function, f(t)	Laplace transform, F(s)
17	$\sinh at$	$a/(s^2-a^2)$
18	$\cosh at$	$s/(s^2-a^2)$
19	$e^{-at} \sin(wt)$, a, w real	$w/\{(s+a)^2 + w^2\}$
20	$e^{-at} \cos(wt)$, a, w real	$(s+a)/\{(s+a)^2 + w^2\}$
21	$\{1/(b-a)\}*(e^{-at}- e^{-bt})$	$1/\{(s+a)(s+b)\}$
22	$\{1/(\tau_1- \tau_2)\}*(e^{-t/\tau_1}- e^{-t/\tau_2})$	$1/\{(\tau_1s+1)(\tau_2s+1)\}$
23	$\frac{1}{\tau\sqrt{(1-\varepsilon^2)}} e^{-\frac{\varepsilon t}{\tau}} \sin\left(\sqrt{(1-\varepsilon^2)}\frac{t}{\tau}\right)$ <p style="text-align: center;"><i>Note: $0 \leq \varepsilon < 1$</i></p>	$\frac{1}{\tau^2 s^2 + 2\varepsilon\tau s + 1}$
24	$1 - e^{-\frac{\varepsilon t}{\tau}} \left\{ \cos\left(\sqrt{(1-\varepsilon^2)}\frac{t}{\tau}\right) + \frac{\varepsilon}{1-\varepsilon^2} \sin\left(\sqrt{(1-\varepsilon^2)}\frac{t}{\tau}\right) \right\}$ <p style="text-align: center;"><i>Note: $0 \leq \varepsilon < 1$</i></p>	$\frac{1}{s(\tau^2 s^2 + 2\varepsilon\tau s + 1)}$