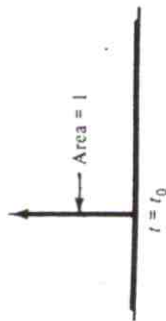


TABLE 7.1
LAPLACE TRANSFORMS OF VARIOUS FUNCTIONS

Time function ($t \geq 0$) Laplace transform

Unit impulse, $\delta(t_0)$

1



Unit pulse, $\delta_A(t)$

$$\frac{1}{A} \frac{1 - e^{-As}}{s}$$



Unit step

$$\frac{1}{s}$$



Ramp, $f(t) = t$

$$\frac{1}{s^2}$$



t^2

$$\frac{2!}{s^3}$$



t^n

$$\frac{n!}{s^{n+1}}$$



e^{-at}

$$\frac{1}{s + a}$$

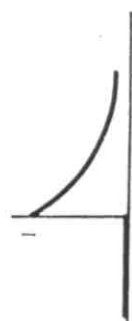


TABLE 7.1 (cont.)

$t^n e^{-at}$

$$\frac{n!}{(s + a)^{n+1}}$$



$\sin(\omega t)$

$$\frac{\omega}{s^2 + \omega^2}$$



$\cos(\omega t)$

$$\frac{s}{s^2 + \omega^2}$$



$\sinh(\omega t)$

$$\frac{\omega}{s^2 - \omega^2}$$



$\cosh(\omega t)$

$$\frac{s}{s^2 - \omega^2}$$



$e^{-at} \sin(\omega t)$

$$\frac{\omega}{(s + a)^2 + \omega^2}$$



$e^{-at} \cos(\omega t)$

$$\frac{(s + a)}{(s + a)^2 + \omega^2}$$



TABLE 8.1
INVERSE LAPLACE TRANSFORMS OF SELECTED EXPRESSIONS

Laplace transform: $f(s)$	Time function: $f(t)$
1. $\frac{1}{(s+a)(s+b)}$	$\frac{e^{-at} - e^{-bt}}{b-a}$
2. $\frac{1}{(s+a)(s+b)(s+c)}$	$\frac{e^{-at}(b-a)(c-a)}{(b-a)(c-a)(c-b)} + \frac{e^{-bt}(a-b)(c-b)}{(a-b)(c-a)(c-b)} + \frac{e^{-ct}(a-b)(a-c)}{(a-b)(a-c)(b-c)}$
3. $\frac{s+a}{(s+b)(s+c)}$	$\frac{q-c}{1} [(a-b)e^{-bt} - (a-c)e^{-ct}]$
4. $\frac{a}{(s+b)^2}$	ate^{-bt}
5. $\frac{a}{(s+b)^3}$	$\frac{a}{2} t^2 e^{-bt}$
6. $\frac{a}{(s+b)^{n+1}}$	$\frac{a}{n!} t^n e^{-bt}$
7. $\frac{1}{s(as+1)}$	$1 - e^{-t/a}$
8. $\frac{1}{s(as+1)^2}$	$1 - \frac{a}{a+l} e^{-t/a}$
9. $\frac{s(s^2 + 2\zeta\omega s + \omega^2)}{\omega^2}$	$1 + \frac{e^{-\zeta\omega t}}{\omega^2} \sin(\omega \sqrt{1-\zeta^2} t - \phi)$
10. $\frac{(1+as)(s^2 + \omega^2)}{s}$	$-\frac{1}{1+a^2\omega^2} e^{-t/a} + \frac{\omega \sqrt{1+a^2\omega^2}}{1} \cos(\omega t - \phi)$
11. $\frac{(s^2 + \omega^2)}{s}$	$\frac{1}{s} \frac{\omega}{\sin \omega t}$
12. $\frac{(s+a+b)(s^2 + \omega^2)}{1}$	$\frac{e^{-at}}{\sin(\omega t - \phi)} + \frac{\omega(a-b)(a-b)^2 + \omega^2}{\omega^2 [1 + \omega^2(a-b)^2]}$

where $\phi = \tan^{-1} \left(\frac{a-b}{\omega} \right)$