TABLE 16.1 Some Laplace Transform Pairs

Name	$f(t),\ t > 0^-$	$F(s)$
Impulse	$\delta(t)$	1
Step	$u(t)$	$\dfrac{1}{s}$
Ramp	t	$\dfrac{1}{s^2}$
Exponential	e^{-at}	$\dfrac{1}{s+a}$
Sine	$\sin \omega t$	$\dfrac{\omega}{s^2+\omega^2}$
Cosine	$\cos \omega t$	$\dfrac{s}{s^2+\omega^2}$
Damped ramp	te^{-at}	$\dfrac{1}{(s+a)^2}$
Damped sine	$e^{-at}\sin \omega t$	$\dfrac{\omega}{(s+a)^2+\omega^2}$
Damped cosine	$e^{-at}\cos \omega t$	$\dfrac{s+a}{(s+a)^2+\omega^2}$
Inverse of $1/s^n$	$\dfrac{t^{n-1}}{(n-1)!}$	$\dfrac{1}{s^n}$
Inverse of s^n	$\dfrac{d^n\delta(t)}{dt^n}$	s^n

TABLE 16.2 Some Operational Transforms

Name	Time Domain	Frequency Domain
Linearity	$af_1(t) + bf_2(t)$	$aF_1(s) + bF_2(s)$
t differentiation	$\dfrac{df(t)}{dt}$	$sF(s) - f(0^-)$
t integration	$\int_{0^-}^{t} f(\xi)\,d\xi$	$\dfrac{F(s)}{s}$
s differentiation	$-tf(t)$	$\dfrac{dF(s)}{ds}$
s integration	$\dfrac{f(t)}{t}$	$\int_{s}^{\infty} F(\xi)\,d\xi$
t shifting	$f(t-a)u(t-a)$	$e^{-as}F(s)$
s shifting	$e^{-at}f(t)$	$F(s+a)$
t scaling	$f(at)$	$\dfrac{1}{a}F\left(\dfrac{s}{a}\right)$
s scaling	$\dfrac{1}{t}f\left(\dfrac{t}{a}\right)$	$F(as)$
Convolution	$f(t) * g(t)$	$F(s)G(s)$
t periodicity	$f(t) = f(t + nT)$	$\dfrac{1}{1 - e^{-sT}}F_1(s)$
Initial value	$f(0^+)$	$\lim\limits_{s\to\infty} sF(s)$
Final value	$f(\infty)$	$\lim\limits_{s\to 0} sF(s)$