

TABLE 17.1 Fourier Transforms of Elementary Functions

TYPE	$f(t)$	$F(\omega)$
impulse	$\delta(t)$	1
constant	A	$2\pi A\delta(\omega)$
signum	$\text{sgn}(t)$	$2/j\omega$
step	$u(t)$	$\pi\delta(\omega) + 1/j\omega$
positive-time exponential	$e^{-at}u(t)$	$1/(a + j\omega), a > 0$
negative-time exponential	$e^{at}u(-t)$	$1/(a - j\omega), a > 0$
positive- and negative-time exponential	$e^{-a t }$	$2a/(a^2 + \omega^2), a > 0$
complex exponential	$e^{j\omega_0 t}$	$2\pi\delta(\omega - \omega_0)$
cosine	$\cos \omega_0 t$	$\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$
sine	$\sin \omega_0 t$	$j\pi[\delta(\omega + \omega_0) - \delta(\omega - \omega_0)]$

TABLE 17.2 Operational Transforms

$f(t)$	$F(\omega)$
$Kf(t)$	$KF(\omega)$
$f_1(t) - f_2(t) + f_3(t)$	$F_1(\omega) - F_2(\omega) + F_3(\omega)$
$d^n f(t)/dt^n$	$(j\omega)^n F(\omega)$
$\int_{-\infty}^t f(x) dx$	$F(\omega)/j\omega$
$f(at)$	$\frac{1}{a} F\left(\frac{\omega}{a}\right), a > 0$
$f(t - a)$	$e^{-j\omega a} F(\omega)$
$e^{j\omega_0 t} f(t)$	$F(\omega - \omega_0)$
$f(t) \cos \omega_0 t$	$\frac{1}{2} F(\omega - \omega_0) + \frac{1}{2} F(\omega + \omega_0)$
$\int_{-\infty}^{\infty} x(\lambda)h(t - \lambda)d\lambda$	$X(\omega)H(\omega)$
$f_1(t)f_2(t)$	$\frac{1}{2\pi} \int_{-\infty}^{\infty} F_1(u)F_2(\omega - u) du$
$t^n f(t)$	$(j)^n \frac{d^n F(\omega)}{d\omega^n}$