Common

$$\operatorname{sinc}\theta = \frac{\sin\pi\theta}{\pi\theta}$$
$$\int e^{at}dt = \frac{1}{a}e^{at} + C$$
$$\int te^{at}dt = \frac{at-1}{t^2}e^{at} + C$$
$$\int t^n e^{at}dt = \frac{t^n}{a}e^{at} - \frac{n}{a}\int t^{n-1}e^{at}dt$$
$$\int e^{at}\sin btdt = \frac{1}{a^2+b^2}e^{at}(a\sin bt - b\cos bt) + C$$
$$\int e^{at}\cos btdt = \frac{1}{a^2+b^2}e^{at}(b\sin bt + a\cos bt) + C$$

Chapter 3

Continuous

$$x(t) = \sum_{k=-\infty}^{+\infty} a_k e^{jk\omega_0 t} = \sum_{k=-\infty}^{+\infty} a_k e^{jk(2\pi/T))t}$$
$$a_k = \frac{1}{T}\int_T x(t)e^{-j\omega_0 t}dt = \frac{1}{T}\int_T x(t)e^{-j(2\pi/T)t}dt$$
$$a_0 = \frac{1}{T}\int_T x(t)dt$$

Convergent

$$\int_T |x(t)|dt < \infty$$

Discrete

$$x[n] = \sum_{k=<N>} a_k e^{jk\omega_0 n} = \sum_{k=<N>} a_k e^{jk(2\pi/N)n}$$
$$a_k = \frac{1}{N}\sum_{k=<N>} x[n]e^{-jk\omega_0 n} = \frac{1}{N}\sum_{k=<N>} x[n]e^{-jk(2\pi/N)n}$$

Chapter 4

Continuous

$$x(t) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} X(j\omega)e^{j\omega t}d\omega$$
$$X(j\omega) = \int_{-\infty}^{+\infty} x(t)e^{-j\omega t}dt$$

Periodic

$$x(t) = \sum_{k=-\infty}^{+\infty} a_k e^{jk\omega_0 t}$$
$$X(j\omega) = \sum_{k=-\infty}^{+\infty} 2\pi a_k \delta(\omega - k\omega_0)$$

Differential Equations

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$
$$H(j\omega) = \frac{(j\omega)+2}{(j\omega)^2 + 4(j\omega) + 3} = \frac{1/2}{j\omega+1} + \frac{1/2}{j\omega+3}$$
$$h(t) = \frac{1}{2}e^{-t}u(t) + \frac{1}{2}e^{-3t}u(t)$$

Chapter 5

Discrete

$$x[n] = \frac{1}{2\pi}\int_{2\pi} X(e^{j\omega}e^{j\omega n})d\omega$$
$$X(e^{j\omega}) = \sum_{n=-\infty}^{\infty} x[n]e^{-j\omega n}$$

Periodic

$$x[n] = \sum_{k=<N>} a_k e^{jk(2\pi/N)n}$$
$$X(e^{j\omega}) = \sum_{k=-\infty}^{\infty} 2\pi a_k \delta\left(\omega - \frac{2\pi k}{N}\right)$$

Differential Equations

$$y[n] - \frac{3}{4}y[n-1] + \frac{1}{8}y[n-2] = 2x[n]$$
$$H(e^{j\omega}) = \frac{2}{1 - \frac{3}{4}e^{-j\omega} + \frac{1}{8}e^{-j2\omega}} = \frac{4}{1 - \frac{1}{2}e^{-j\omega}} - \frac{2}{1 - \frac{1}{4}e^{-j\omega}}$$
$$h[n] = 4\left(\frac{1}{2}\right)^n u[n] - 2\left(\frac{1}{4}\right)^n u[n]$$

Chapter 6

Group Delay

$$\tau(\omega) = -\frac{d}{d\omega}\{\sphericalangle H_2 j\omega\}$$

Step response

$$s(t) = \int_{-\infty}^{t} h(\tau)d\tau$$
$$s[n] = \sum_{m=-\infty}^{n} h[m]$$

First Order Systems

$$\tau\frac{dy(t)}{dt} + y(t) = x(t)$$
$$H(j\omega) = \frac{1}{j\omega\tau + 1}$$
$$h(t) = \frac{1}{\tau}e^{-t/\tau}u(t)$$
$$s(t) = h(t) * u(t) = [1 - e^{-t/\tau}]u(t)$$

Second Order Systems

$$\frac{d^2y(t)}{dt^2} + 2\xi\omega_n^2\frac{dy(t)}{dt} + \omega_n^2 y(t) = \omega_n^2 x(t)$$

For $\xi \neq 1$,

$$H(j\omega) == \frac{M}{j\omega - c_1} - \frac{M}{j\omega - c_2}$$
$$c_{1,2} = -\xi\omega_n \pm \omega_n\sqrt{\xi^2 - 1}, M = \frac{\omega_n}{2\sqrt{\xi^2 - 1}}$$
$$h(t) = M[e^{c_1 t} - e^{c_2 t}]u(t)$$
$$s(t) = h(t) * u(t) = \left\{1 + M\left[\frac{e^{c_1 t}}{c_1} - \frac{e^{c_2 t}}{c_2}\right]\right\}u(t)$$

For $\xi = 1$,

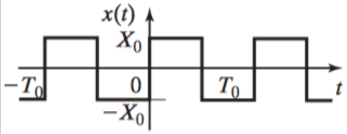
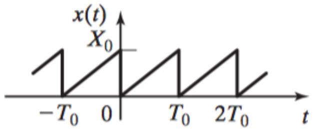
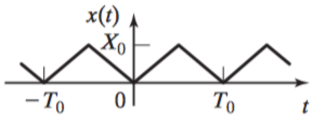
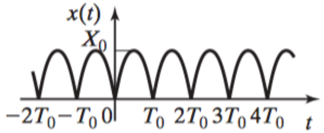
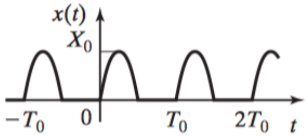
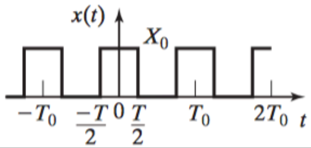
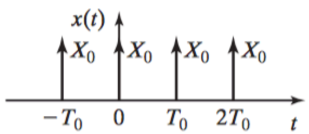
$$H(j\omega) = \frac{\omega_n^2}{(j\omega + \omega_n)^2}$$
$$h(t) = \omega_n^2 te^{-\omega_n t}u(t)$$
$$s(t) = [1 - e^{-\omega_n t} - \omega_n te^{-\omega_n t}]u(t)$$

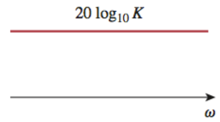
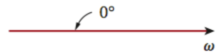
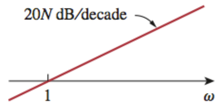
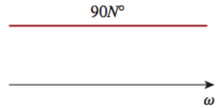
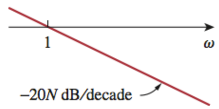
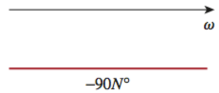
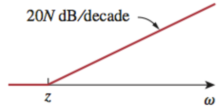
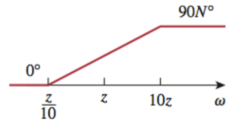
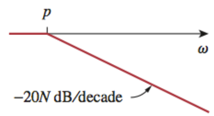
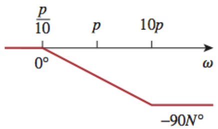
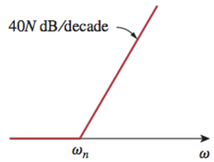
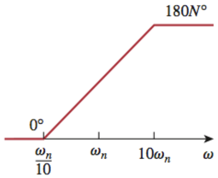
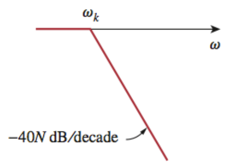
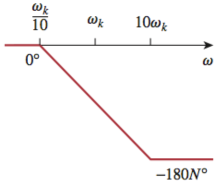
For $0 < \xi < 1$,

$$H(j\omega) = \frac{1}{(j\omega/\omega_n)^2 + 2\xi(j\omega/\omega_n) + 1}$$
$$h(t) = \frac{\omega_n e^{-\xi\omega_n t}}{\sqrt{1-\xi^2}}[\sin(\omega_n\sqrt{1-\xi^2})t]u(t)$$

$0 < \xi < 1$	under damped
$\xi = 1$	critical damped
$\xi > 1$	over damped

$$\omega_{max} = \omega_n\sqrt{1 - 2\xi^2}$$
$$|H(j\omega_{max}) = \frac{1}{2\xi\sqrt{1-\xi^2}}$$

Name	Waveform	C_0	$C_k, k \neq 0$	Comments
1. Square wave		0	$-j\frac{2X_0}{\pi k}$	$C_k = 0$, k even
2. Sawtooth		$\frac{X_0}{2}$	$j\frac{X_0}{2\pi k}$	
3. Triangular wave		$\frac{X_0}{2}$	$\frac{-2X_0}{(\pi k)^2}$	$C_k = 0$, k even
4. Full-wave rectified		$\frac{2X_0}{\pi}$	$\frac{-2X_0}{\pi(4k^2-1)}$	
5. Half-wave rectified		$\frac{X_0}{\pi}$	$\frac{-X_0}{\pi(k^2-1)}$	$C_k = 0$, k odd, except $C_1 = -j\frac{X_0}{4}$ and $C_{-1} = j\frac{X_0}{4}$
6. Rectangular wave		$\frac{TX_0}{T_0}$	$\frac{TX_0}{T_0}\,\text{sinc}\,\frac{Tk\omega_0}{2}$	$\frac{Tk\omega_0}{2} = \frac{\pi Tk}{T_0}$
7. Impulse train		$\frac{X_0}{T_0}$	$\frac{X_0}{T_0}$	

Factor	Magnitude	Phase
K		
$(j\omega)^N$		
$\frac{1}{(j\omega)^N}$		
$\left(1+\frac{j\omega}{z}\right)^N$		
$\frac{1}{(1+j\omega/p)^N}$		
$\left[1+\frac{2j\omega\zeta}{\omega_n}+\left(\frac{j\omega}{\omega_n}\right)^2\right]^N$		
$\frac{1}{[1+2j\omega\zeta/\omega_k+(j\omega/\omega_k)^2]^N}$		

Property	Aperiodic Signal	Fourier transform	Aperiodic Signal	Fourier transform
$\left.\begin{matrix} x(t) \\ y(t) \end{matrix}\right\}$	Period with period T and fundamental frenquency $\omega_0 = 2\pi/T$	$\begin{matrix} a_k \\ b_k \end{matrix}$	$\left.\begin{matrix} x[n] \\ y[n] \end{matrix}\right\}$ Period with period N and fundamental frenquency $\omega_0 = 2\pi/N$	$\left.\begin{matrix} X(e^{j\omega}) \\ Y(e^{j\omega}) \end{matrix}\right\}$ periodic with period N
Linearity	$Ax(t) + By(t)$	$Aa_k + Bb_k$	$Ax[n] + By[n]$	$Aa_k + Bb_k$
Time Shifting	$x(t - t_0)$	$a_k e^{-jk\omega_0 t_0} = a_k e^{-jk(2\pi/T)t_0}$	$x[n - n_0]$	$a_k e^{-jk(2\pi/N)n_0}$
Frequency Shifting	$e^{-jM\omega_0 t} = e^{-jM(2\pi/T)t}x(t)$	a_{k-M}	$e^{-jM(2\pi/N)t}x[n]$	a_{k-M}
Conjugation	$x^*(t)$	a^*_{-k}	$x^*[n]$	a^*_{-k}
Time Reversal	$x(-t)$	a_{-k}	$x[-n]$	a_{-k}
Time and Frequency Scaling / Time expansion	$x(\alpha t), \alpha > 0$	a_{-k}	$x_m[n] = \begin{cases} x[n/m] & \text{if } n = \text{ multiple of } m \\ 0 & \text{if } n \neq \text{ multiple of } m \end{cases}$	$\frac{1}{m} a_k$
Periodic Convolution	$\int_T x(\tau) y(t - \tau) d\tau$	$Ta_k b_k$	$\sum_{r=<N>} x[r]y[n-r]$	$Na_k b_k$
Multiplication	$x(t)y(t)$	$\sum_{l=-\infty}^{+\infty} a_l b_k - l$	$x[n]y[n]$	$\sum_{l=<N>} a_l b_{k-l}$
Differentiation	$\frac{d}{dt} x(t)$	$jk\omega_0 a_k = jk\frac{2\pi}{T} a_k$	$x[n] - x[n-1]$	$(1 - e^{-jk(2\pi/N)}) a_k$
Integration/Accumulation	$\int_{-\infty}^{t} x(t) dt$	$\frac{1}{jk\omega_0} a_k = \frac{1}{jk(2\pi/T)} a_k$	$\sum_{k=-\infty}^{+\infty} x[k]$	$\frac{1}{1 - e^{-jk(2\pi/N)}} a_k$
Conjugate Symmetry for Real Signals	$x(t)$ real	$\begin{cases} a_k = a^*_{-k} \\ \mathfrak{Re}\{a_k\} = \mathfrak{Re}\{a_{-k}\} \\ \mathfrak{Im}\{a_k\} = -\mathfrak{Im}\{a_{-k}\} \\ \lvert a_k \rvert = \lvert a_{-k} \rvert \\ \sphericalangle a_k = -\sphericalangle a_{-k} \end{cases}$	$x[n]$ real	$\begin{cases} a_k = a^*_{-k} \\ \mathfrak{Re}\{a_k\} = \mathfrak{Re}\{a_{-k}\} \\ \mathfrak{Im}\{a_k\} = -\mathfrak{Im}\{a_{-k}\} \\ \lvert a_k \rvert = \lvert a_{-k} \rvert \\ \sphericalangle a_k = -\sphericalangle a_{-k} \end{cases}$
Symmetry for Real and Even Signals	$x(t)$ real and even	a_k real and even	$x[n]$ real and even	a_k real and even
Symmetry for Real and Odd Signals	$x(t)$ real and odd	a_k purely imaginary and odd	$x[n]$ real and odd	a_k purely imaginary and odd
Even-Odd Decomposition for Real Signals	$x_e(t) = \mathfrak{Ev}\{x(t)\}$ [$x(t)$ real] $x_o(t) = \mathfrak{Od}\{x(t)\}$ [$x(t)$ real]	$\mathfrak{Re}\{a_k\}$ $j\mathfrak{Im}\{a_k\}$	$x_e[n] = \mathfrak{Ev}\{x[n]\}$ [$x[n]$ real] $x_o[n] = \mathfrak{Od}\{x[n]\}$ [$x[n]$ real]	$\mathfrak{Re}\{a_k\}$ $j\mathfrak{Im}\{a_k\}$
Parseval's Relation for Aperiodic Signals	$\frac{1}{T}\int_T \lvert x(t)\rvert^2 dt = \sum_{k=-\infty}^{+\infty} \lvert a_k \rvert^2$		$\frac{1}{N}\sum_N \lvert x[n]\rvert^2 = \sum_{k=<N>} \lvert a_k \rvert^2$	

Table 1: Properties of Fourier Series

Property	Aperiodic Signal	Fourier transform	Aperiodic Signal	Fourier transform
	$x(t)$ $y(t)$	$X(j\omega)$ $Y(j\omega)$	$x[n]$ $y[n]$	$\left.\begin{matrix} X(e^{j\omega}) \\ Y(e^{j\omega}) \end{matrix}\right\}$ periodic with period 2π
Linearity	$ax(t) + by(t)$	$aX(j\omega) + bY(j\omega)$	$ax[n] + by[n]$	$aX(e^{j\omega}) + bY(e^{j\omega})$
Time Shifting	$x(t - t_0)$	$e^{-j\omega t_0} X(j\omega)$	$x[n - n_0]$	$e^{-j\omega n_0} X(e^{j\omega})$
Frequency Shifting	$e^{-j\omega t_0} x(t)$	$X(j(\omega - \omega_0))$	$e^{j\omega_0 n}$	$X(e^{j(\omega - \omega_0)})$
Conjugation	$x^*(t)$	$X^*(-j\omega)$	$x^*[n]$	$X^*(e^{-j\omega})$
Time Reversal	$x(-t)$	$X(-j\omega)$	$x[-n]$	$X(e^{-j\omega})$
Time and Frequency Scaling / Time expansion	$x(at)$	$\frac{1}{\lvert a\rvert} X(\frac{j\omega}{a})$	$x_k[n] = \begin{cases} x[n/k] & \text{if } n = \text{ multiple of } k \\ 0 & \text{if } n \neq \text{ multiple of } k \end{cases}$	$X(e^{jk\omega})$
Convolution	$x(t) * y(t)$	$X(j\omega)Y(j\omega)$	$x[n] * y[n]$	$X(e^{j\omega})Y(e^{j\omega})$
Multiplication	$x(t)y(t)$	$\frac{1}{2\pi} \int_{-\infty}^{+\infty} X(j\omega)Y(j(\omega - \theta))d\theta$	$x[n]y[n]$	$\frac{1}{2\pi} \int_{2\pi} X(e^{j\theta})Y(e^{j(\omega-\theta)})d\theta$
Differentiation in Time	$\frac{d}{dt}x(t)$	$j\omega X(j\omega)$	$x[n] - x[n-1]$	$(1 - e^{-j\omega})X(e^{j\omega})$
Integration/Accumulation	$\int_{-\infty}^{t} x(t)dt$	$\frac{1}{j\omega}X(j\omega) + \pi X(0)\delta(\omega)$	$\sum_{k=-\infty}^{+\infty} x[k]$	$\frac{1}{1 - e^{-j\omega}} X(e^{j\omega})$
Differentiation in Frequency	$tx(t)$	$j\frac{d}{d\omega}X(j\omega)$	$nx[n]$	$j\frac{dX(e^{j\omega})}{d\omega}$
Conjugate Symmetry for Real Signals	$x(t)$ real	$\begin{cases} X(j\omega) = X^*(-j\omega) \\ \mathfrak{Re}\{X(j\omega)\} = \mathfrak{Re}\{X(-j\omega)\} \\ \mathfrak{Im}\{X(j\omega)\} = -\mathfrak{Im}\{X(-j\omega)\} \\ \lvert X(j\omega)\rvert = \lvert X(-j\omega)\rvert \\ \sphericalangle X(j\omega) = -\sphericalangle X(-j\omega) \end{cases}$	$x[n]$ real	$\begin{cases} X(e^{j\omega}) = X^*(e^{-j\omega}) \\ \mathfrak{Re}\{X(e^{j\omega})\} = \mathfrak{Re}\{X(e^{-j\omega})\} \\ \mathfrak{Im}\{X(e^{j\omega})\} = -\mathfrak{Im}\{X(e^{-j\omega})\} \\ \lvert X(e^{j\omega})\rvert = \lvert X(e^{-j\omega})\rvert \\ \sphericalangle X(e^{j\omega}) = -\sphericalangle X(e^{-j\omega}) \end{cases}$
Symmetry for Real and Even Signals	$x(t)$ real and even	$X(j\omega)$ real and even	$x[n]$ real and even	$X(e^{j\omega})$ real and even
Symmetry for Real and Odd Signals	$x(t)$ real and odd	$X(j\omega)$ purely imaginary and odd	$x[n]$ real and odd	$X(e^{j\omega})$ purely imaginary and odd
Even-Odd Decomposition for Real Signals	$x_e(t) = \mathfrak{Ev}\{x(t)\}$ [$x(t)$ real] $x_o(t) = \mathfrak{Od}\{x(t)\}$ [$x(t)$ real]	$\mathfrak{Re}\{X(j\omega)\}$ $j\mathfrak{Im}\{X(j\omega)\}$	$x_e[n] = \mathfrak{Ev}\{x[n]\}$ [$x[n]$ real] $x_o[n] = \mathfrak{Od}\{x[n]\}$ [$x[n]$ real]	$\mathfrak{Re}\{X(e^{j\omega})\}$ $j\mathfrak{Im}\{X(e^{j\omega})\}$
Parseval's Relation for Aperiodic Signals	$\int_{-\infty}^{+\infty} \lvert x(t)\rvert^2 dt = \frac{1}{2\pi}\int_{-\infty}^{+\infty} \lvert X(j\omega)\rvert^2 d\omega$		$\sum_{n=-\infty}^{+\infty} \lvert x[n]\rvert^2 dt = \frac{1}{2\pi}\int_{2\pi} \lvert X(e^{j\omega})\rvert^2 d\omega$	

Table 2: Properties of Fourier Transform

Signal	Fourier transform	Fourier series coefficients	Signal	Fourier transform	Fourier series coefficients
$\sum_{k=-\infty}^{+\infty} a_k e^{jk\omega_0 t}$	$2\pi \sum_{k=-\infty}^{+\infty} a_k \delta(\omega - k\omega_0)$	a_k	$\sum_{k=<N>)} a_k e^{jk(2n/N)n}$	$2\pi \sum_{k=-\infty}^{+\infty} a_k \delta\left(\omega - \frac{2\pi k}{N}\right)$	a_k
$e^{j\omega_0 t}$	$2\pi\delta(\omega - k\omega_0)$	$a_1 = 1$ $a_k = 0,\ \text{otherwise}$	$e^{j\omega_0 n}$	$2\pi \sum_{l=-\infty}^{+\infty} \delta(\omega - \omega_0 - 2\pi l)$	$\omega_0 = \frac{2\pi m}{N}$ $a_k = \begin{cases} 1, k = m, m \pm N, m \pm 2N, \dots \\ 0, \text{otherwise} \end{cases}$
$\cos\omega_0 t$	$\pi[\delta(\omega - k\omega_0) + \delta(\omega + k\omega_0)]$	$a_1 = a_{-1} = \frac{1}{2}$ $a_k = 0,\ \text{otherwise}$	$\cos\omega_0 n$	$\pi \sum_{l=-\infty}^{+\infty} \delta(\omega - \omega_0 - 2\pi l) + \delta(\omega + \omega_0 - 2\pi l)$	$\omega_0 = \frac{2\pi m}{N}$ $a_k = \begin{cases} \frac{1}{2}, k = \pm m, \pm m \pm N, \pm m \pm 2N, \dots \\ 0, \text{otherwise} \end{cases}$
$\sin\omega_0 t$	$\frac{\pi}{j}\delta(\omega - k\omega_0) - \delta(\omega + k\omega_0)]$	$a_1 = a_{-1} = \frac{1}{2j}$ $a_k = 0,\ \text{otherwise}$	$\sin\omega_0 n$	$\frac{\pi}{j} \sum_{l=-\infty}^{+\infty} \delta(\omega - \omega_0 - 2\pi l) - \delta(\omega + \omega_0 - 2\pi l)$	$\omega_0 = \frac{2\pi r}{N}$ $a_k = \begin{cases} \frac{1}{2j}, k = r, r \pm N, r \pm 2N, \dots \\ -\frac{1}{2j}, k = -r, -r \pm N, -r \pm 2N, \dots \\ 0, \text{otherwise} \end{cases}$
$x(t) = 1$	$2\pi\delta(\omega)$	$a_0 = 1$ $a_k = 0,\ k \neq 0$	$x[n] = 1$	$2\pi \sum_{l=-\infty}^{+\infty} \delta(\omega - 2\pi l)$	$a_k = \begin{cases} 1, & k = 0, \pm N, \pm 2N \\ 0, & \text{otherwise k} \neq 0 \end{cases}$
$x(t) = \begin{cases} 1, & \lvert t \rvert < T_1 \\ 0, & T_1 < \lvert t \rvert \leqslant \frac{T}{2} \end{cases}$ $x(t+T) = x(t)$	$\sum_{k=-\infty}^{+\infty} \frac{2\sin k\omega_0 T_1}{k} \delta(\omega - \omega_0)$	$\frac{\sin k\omega_0 T_1}{k\pi}$	$x[n] = \begin{cases} 1, & \lvert n \rvert \leqslant N_1 \\ 0, & N_1 < \lvert n \rvert \leqslant N/2 \end{cases}$ $x[n+N] = x[n]$	$2\pi \sum_{k=-\infty}^{+\infty} a_k \delta\left(\omega - \frac{2\pi k}{N}\right)$	$a_k = \frac{\sin[(2\pi k/N)(N_1 + \frac{1}{2})]}{N \sin[2\pi k/2N]}, k \neq 0, \pm N, \pm 2N$ $a_k = \frac{2N_1 + 1}{N}, k = 0, \pm N, \pm 2N$
$\sum_{n=-\infty}^{+\infty} \delta(t - nT)$	$\frac{2\pi}{T} \sum_{n=-\infty}^{+\infty} \delta\left(\omega - \frac{2\pi k}{T}\right)$	$a_k = \frac{1}{T}$ for all k	$\sum_{n=-\infty}^{+\infty} \delta[n - kN]$	$\frac{2\pi}{N} \sum_{n=-\infty}^{+\infty} \delta\left(\omega - \frac{2\pi k}{N}\right)$	$a_k = \frac{1}{T}$ for all k
$x(t) \begin{cases} 1, & \lvert t \rvert < T_1 \\ 0, & \lvert t \rvert > T_1 \end{cases}$	$\frac{2\sin\omega T_1}{\omega}$	—	$x[n] \begin{cases} 1, & \lvert n \rvert \leqslant N \\ 0, & \lvert n \rvert > N \end{cases}$	$\frac{\sin[\omega(N_1 + \frac{1}{2})]}{\sin(\omega/2)}$	—
$\frac{\sin Wt}{\pi t}$	$X(j\omega) = \begin{cases} 1, & \lvert \omega \rvert < W \\ 0, & \lvert \omega \rvert > W \end{cases}$	—	$\frac{\sin Wn}{\pi n} = \frac{W}{\pi} \mathrm{sinc}\left(\frac{Wn}{\pi}\right)$	$X(\omega) = \begin{cases} 1, & 0 < \lvert \omega \rvert < W \\ 0, & W < \lvert \omega \rvert < \pi \end{cases}$	—
$\delta(t)$	1	—	$\delta[n]$	1	—
$u(t)$	$\frac{1}{j\omega} + \pi\delta(\omega)$	—	$u[n]$	$\frac{1}{1 - e^{-j\omega}} + \sum_{k=-\infty}^{+\infty} \pi\delta(\omega - 2\pi k)$	—
$\delta(t - t_0)$	$e^{-j\omega t_0}$	—	$\delta[n - n_0]$	$e^{-j\omega n_0}$	—
$e^{-at}u(t), \mathfrak{Re}\{a\} > 0$	$\frac{1}{a + j\omega}$	—	$a^n u[n], \lvert a \rvert < 1$	$\frac{1}{1 - ae^{-j\omega}}$	—
$te^{-at}u(t), \mathfrak{Re}\{a\} > 0$	$\frac{1}{(a + j\omega)^2}$	—	$(n+1)a^n u[n], \lvert a \rvert < 1$	$\frac{1}{(1 - ae^{-j\omega})^2}$	—
$\frac{t^{n-1}}{(n-1)!} e^{-at}u(t), \mathfrak{Re}\{a\} > 0$	$\frac{1}{(a + j\omega)^n}$	—	$\frac{(n+r-1)!}{n!(r-1)!} a^n u[n], \lvert a \rvert < 1$	$\frac{1}{(1 - ae^{-j\omega})^n}$	—

Table 3: Basic Fourier Transform Pairs