Table of Discrete-Time Fourier Transform Pairs:

$$\text{Discrete-Time Fourier Transform} \quad : \quad X(\Omega) = \sum_{n=-\infty}^{\infty} x[n]e^{-j\Omega n}$$

$$\text{Inverse Discrete-Time Fourier Transform} \quad : \quad x[n] = \frac{1}{2\pi}\int_{2\pi} X(\Omega)e^{j\Omega t}\, d\Omega\ .$$

$x[n]$	$X(\Omega)$	condition
$a^n u[n]$	$\frac{1}{1-ae^{-j\Omega}}$	$\|a\| < 1$
$(n+1)a^n u[n]$	$\frac{1}{(1-ae^{-j\Omega})^2}$	$\|a\| < 1$
$\frac{(n+r-1)!}{n!(r-1)!}a^n u[n]$	$\frac{1}{(1-ae^{-j\Omega})^r}$	$\|a\| < 1$
$\delta[n]$	1	
$\delta[n-n_0]$	$e^{-j\Omega n_0}$	
$x[n]=1$	$2\pi \sum_{k=-\infty}^{\infty} \delta(\Omega - 2\pi k)$	
$u[n]$	$\frac{1}{1-e^{-j\Omega}} + \sum_{k=-\infty}^{\infty} \pi\delta(\Omega - 2\pi k)$	
$e^{j\Omega_0 n}$	$2\pi \sum_{k=-\infty}^{\infty} \delta(\Omega - \Omega_0 - 2\pi k)$	
$\cos(\Omega_0 n)$	$\pi \sum_{k=-\infty}^{\infty} \{\delta(\Omega - \Omega_0 - 2\pi k) + \delta(\Omega + \Omega_0 - 2\pi k)\}$	
$\sin(\Omega_0 n)$	$\frac{\pi}{j} \sum_{k=-\infty}^{\infty} \{\delta(\Omega - \Omega_0 - 2\pi k) - \delta(\Omega + \Omega_0 - 2\pi k)\}$	
$\sum_{k=-\infty}^{\infty} \delta[n-kN]$	$\frac{2\pi}{N} \sum_{k=-\infty}^{\infty} \delta\left(\Omega - \frac{2\pi k}{N}\right)$	
$x[n] = \begin{cases} 1 \quad , \quad \|n\| \le N \\ 0 \quad , \quad \|n\| > N \end{cases}$	$\frac{\sin(\Omega(N+1/2))}{\sin(\Omega/2)}$	
$\frac{\sin(Wn)}{\pi n} = \frac{W}{\pi}\text{sinc}\left(\frac{Wn}{\pi}\right)$	$X(\Omega) = \begin{cases} 1 \quad , \quad 0 \le \|\Omega\| \le W \\ 0 \quad , \quad W < \|\Omega\| \le \pi \end{cases}$ $X(\Omega)$ is periodic with period 2π	

Table of Discrete-Time Fourier Transform Properties: For each property, assume

$$x[n] \overset{DTFT}{\longleftrightarrow} X(\Omega) \quad \text{and} \quad y[n] \overset{DTFT}{\longleftrightarrow} Y(\Omega)$$

Property	Time domain	DTFT domain
Linearity	$Ax[n] + By[n]$	$AX(\Omega) + BY(\Omega)$
Time Shifting	$x[n - n_0]$	$X(\Omega)e^{-j\Omega n_0}$
Frequency Shifting	$x[n]e^{j\Omega_0 n}$	$X(\Omega - \Omega_0)$
Conjugation	$x^*[n]$	$X^*(-\Omega)$
Time Reversal	$x[-n]$	$X(-\Omega)$
Convolution	$x[n] * y[n]$	$X(\Omega)Y(\Omega)$
Multiplication	$x[n]y[n]$	$\frac{1}{2\pi}\int_{2\pi} X(\theta)Y(\Omega - \theta)d\theta$
Differencing in Time	$x[n] - x[n-1]$	$(1 - e^{-j\Omega})X(\Omega)$
Accumulation	$\sum_{k=-\infty}^{\infty} x[k]$	$\frac{1}{1-e^{-j\Omega}} + \pi X(0)\sum_{k=-\infty}^{\infty}\delta(\Omega - 2\pi k)$
Frequency Differentiation	$nx[n]$	$j\frac{dX(\Omega)}{d\Omega}$
Parseval's Relation for Aperiodic Signals	$\sum_{k=-\infty}^{\infty} \lvert x[k]\rvert^2$	$\frac{1}{2\pi}\int_{2\pi} \lvert X(\Omega)\rvert^2 d\Omega$

Table of Z-Transform Pairs:

$$\text{Z-Transform} \quad : \quad X(z) = \sum_{n=-\infty}^{\infty} x[n] z^{-n}$$

$$\text{Inverse Z-Transform} \quad : \quad x[n] = \frac{1}{2\pi j} \oint_{\mathcal{C}} X(z) z^{n-1} \, dz \; .$$

$x[n]$	$X(\Omega)$
$a^n u[n]$	$\frac{1}{1 - az^{-1}}$
$-a^n u[-n-1]$	$\frac{1}{1 - az^{-1}}$
$na^n u[n]$	$\frac{az^{-1}}{(1 - az^{-1})^2}$
$\delta[n]$	1
$\delta[n - n_0]$	z^{-n_0}
$u[n]$	$\frac{1}{1 - z^{-1}}$
$\cos(\Omega_0 n) u[n]$	$\frac{1 - z^{-1}\cos(\Omega_0)}{1 - 2z^{-1}\cos(\Omega_0) + z^{-2}}$
$\sin(\Omega_0 n) u[n]$	$\frac{z^{-1}\sin(\Omega_0)}{1 - 2z^{-1}\cos(\Omega_0) + z^{-2}}$