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
$a^n u[n]$	$\dfrac{1}{1-ae^{-j\Omega}}$	$\lvert a\rvert < 1$
$(n+1)a^n u[n]$	$\dfrac{1}{(1-ae^{-j\Omega})^2}$	$\lvert a\rvert < 1$
$\dfrac{(n+r-1)!}{n!(r-1)!}a^n u[n]$	$\dfrac{1}{(1-ae^{-j\Omega})^r}$	$\lvert a\rvert < 1$
$\delta[n]$	1	
$\delta[n-n_0]$	$e^{-j\Omega n_0}$	
$x[n]=1$	$2\pi \displaystyle\sum_{k=-\infty}^{\infty} \delta(\Omega-2\pi k)$	
$u[n]$	$\dfrac{1}{1-e^{-j\Omega}} + \displaystyle\sum_{k=-\infty}^{\infty} \pi\delta(\Omega-2\pi k)$	
$e^{j\Omega_0 n}$	$2\pi \displaystyle\sum_{k=-\infty}^{\infty} \delta(\Omega-\Omega_0-2\pi k)$	
$\cos(\Omega_0 n)$	$\pi \displaystyle\sum_{k=-\infty}^{\infty} \{\delta(\Omega-\Omega_0-2\pi k)+\delta(\Omega+\Omega_0-2\pi k)\}$	
$\sin(\Omega_0 n)$	$\dfrac{\pi}{j} \displaystyle\sum_{k=-\infty}^{\infty} \{\delta(\Omega-\Omega_0-2\pi k)-\delta(\Omega+\Omega_0-2\pi k)\}$	
$\displaystyle\sum_{k=-\infty}^{\infty} \delta[n-kN]$	$\dfrac{2\pi}{N} \displaystyle\sum_{k=-\infty}^{\infty} \delta\left(\Omega-\frac{2\pi k}{N}\right)$	
$x[n] = \begin{cases} 1 & , \quad \lvert n\rvert \le N \\ 0 & , \quad \lvert n\rvert > N \end{cases}$	$\dfrac{\sin(\Omega(N+1/2))}{\sin(\Omega/2)}$	
$\dfrac{\sin(Wn)}{\pi n} = \dfrac{W}{\pi}\mathrm{sinc}\left(\dfrac{Wn}{\pi}\right)$	$X(\Omega) = \begin{cases} 1 & , \quad 0 \le \lvert\Omega\rvert \le W \\ 0 & , \quad W < \lvert\Omega\rvert \le \pi \end{cases}$	

$X(\Omega)$ 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	$\sum_{k=-\infty}^{\infty} \lvert x[k]\rvert^2$	$\frac{1}{2\pi}\int_{2\pi} \lvert X(\Omega)\rvert^2 d\Omega$