Table of Z-Transforms

Function or Theorem	Discrete-Time Domain $x[n]$	Z-Transform $X(z) = \mathcal{Z}\{x[n]\}$	ROC
Unit Impulse	$\delta[n]$	1	all z
Shifted Impulse	$\delta[n-k]$	z^{-k}	all z (except $z=0$ if $k>0$)
Unit Step	$u[n]$	$\frac{1}{1-z^{-1}} = \frac{z}{z-1}$	$\lvert z\rvert > 1$
Causal Ramp	$n\,u[n]$	$\frac{z^{-1}}{(1-z^{-1})^2} = \frac{z}{(z-1)^2}$	$\lvert z\rvert > 1$
Causal n^2	$n^2\,u[n]$	$\frac{z(z+1)}{(z-1)^3}$	$\lvert z\rvert > 1$
Real Exponential	$a^n u[n]$	$\frac{1}{1-az^{-1}} = \frac{z}{z-a}$	$\lvert z\rvert > \lvert a\rvert$
Anti-Causal Exponential	$-a^n u[-n-1]$	$\frac{z}{z-a}$	$\lvert z\rvert < \lvert a\rvert$
Exponential × Ramp	$n\,a^n u[n]$	$\frac{az^{-1}}{(1-az^{-1})^2} = \frac{az}{(z-a)^2}$	$\lvert z\rvert > \lvert a\rvert$
Exponential $\times n^2$	$n^2 a^n u[n]$	$\frac{az(z+a)}{(z-a)^3}$	$\lvert z\rvert > \lvert a\rvert$
n-th Power Times Exponential	$\binom{n}{k} a^{n-k} u[n]$	$\frac{z}{(z-a)^{k+1}}$	$\lvert z\rvert > \lvert a\rvert$
Cosine	$\cos(\omega_0 n)\,u[n]$	$\frac{1-z^{-1}\cos\omega_0}{1-2z^{-1}\cos\omega_0+z^{-2}}$	$\lvert z\rvert > 1$
Sine	$\sin(\omega_0 n)\,u[n]$	$\frac{z^{-1}\sin\omega_0}{1-2z^{-1}\cos\omega_0+z^{-2}}$	$\lvert z\rvert > 1$
Exponential Decay Cosine	$r^n\cos(\omega_0 n)\,u[n]$	$\frac{1-rz^{-1}\cos\omega_0}{1-2rz^{-1}\cos\omega_0+r^2z^{-2}}$	$\lvert z\rvert > r$
Exponential Decay Sine	$r^n\sin(\omega_0 n)\,u[n]$	$\frac{rz^{-1}\sin\omega_0}{1-2rz^{-1}\cos\omega_0+r^2z^{-2}}$	$\lvert z\rvert > r$
Complex Exponential	$e^{j\omega_0 n}u[n]$	$\frac{z}{z-e^{j\omega_0}}$	$\lvert z\rvert > 1$
Linearity	$ax[n]+by[n]$	$aX(z)+bY(z)$	at least $\mathrm{ROC}_X \cap \mathrm{ROC}_Y$
Time Shift	$x[n-k]$	$z^{-k}X(z)$	same ROC as $X(z)$
Multiplication by n	$n\,x[n]$	$-z\frac{d}{dz}X(z)$	same ROC as $X(z)$
Multiplication by n^k	$n^k x[n]$	$\left(-z\frac{d}{dz}\right)^k X(z)$	same ROC as $X(z)$
Scaling in z (Exponential Weighting)	$a^n x[n]$	$X\left(\frac{z}{a}\right)$	$\lvert a\rvert \cdot$ ROC of X
Time Reversal	$x[-n]$	$X\left(z^{-1}\right)$	$1/$ROC of X
Conjugation	$x^*[n]$	$X^*(z^*)$	same ROC as $X(z)$
Convolution	$x[n]*y[n]$	$X(z)\,Y(z)$	at least $\mathrm{ROC}_X \cap \mathrm{ROC}_Y$
Correlation	$\sum_{k=-\infty}^{\infty} x[k]\,y[k-n]$	$X(z)\,Y\left(z^{-1}\right)$	at least $\mathrm{ROC}_X \cap 1/\mathrm{ROC}_Y$
Accumulation	$\sum_{k=-\infty}^{n} x[k]$	$\frac{X(z)}{1-z^{-1}}$	$\mathrm{ROC} \cap \lvert z\rvert > 1$
First Difference	$x[n]-x[n-1]$	$(1-z^{-1})\,X(z)$	$\mathrm{ROC} \cap \lvert z\rvert \neq 0$
Parseval's Theorem	$\sum_{n=-\infty}^{\infty} \lvert x[n]\rvert^2$	$\frac{1}{2\pi j}\oint X(z)X^*(1/z^*)\,z^{-1}\,dz$	—
Initial Value Theorem	$x[0]$	$\lim_{z\to\infty} X(z)$	requires $x[n]$ causal
Final Value Theorem	$\lim_{n\to\infty} x[n]$	$\lim_{z\to 1}(z-1)X(z)$	requires poles inside $\lvert z\rvert < 1$ (except simple pole at $z=1$)