Properties of the *z*-Transform

Property	Signal	*z*-Transform
	$x[n]$	$X(z)$
	$x_1[n]$	$X_1(z)$
	$x_2[n]$	$X_2(z)$
Linearity	$ax_1[n]+bx_2[n]$	$aX_1(z)+bX_2(z)$
Time shifting	$x[n-n_0]$	$z^{-n_0}X(z)$
Scaling in the z-domain	$e^{j\omega_0 n}x[n]$	$X(e^{-j\omega_0}z)$
	$z_0^n x[n]$	$X(\frac{z}{z_0})$
	$a^n x[n]$	$X(a^{-1}z)$
Time Expansion	$x_{(k)}[n]=\begin{cases}x[r], & n=rk\\ 0, & n\neq rk\end{cases}$ *for some integer r*	$X(z^k)$
Conjugation	$x^*[n]$	$X^*(z^*)$
Convolution	$x_1[n]*x_2[n]$	$X_1(z)X_2(z)$
First difference	$x[n]-x[n-1]$	$(1-z^{-1})X(z)$
Accumulation	$\sum_{k=-\infty}^{n}x[k]$	$\frac{1}{1-z^{-1}}X(z)$
Differentiation in the *z*-domain	$nx[n]$	$-z\frac{dX(z)}{dz}$
Initial Value Theorem If $x[n]=0$ for $n<0$, then $x[0]=\lim_{z\to\infty}X(z)$		