Causal Signals

3	$u[n]$	$\frac{z}{z-1}$	$\|z\| > 1$
4	$\alpha^n u[n]$	$\frac{z}{z-\alpha}$	$\|z\| > \|\alpha\|$
5	$(-\alpha)^n u[n]$	$\frac{z}{z+\alpha}$	$\|z\| > \|\alpha\|$
6	$nu[n]$	$\frac{z}{(z-1)^2}$	$\|z\| > 1$
7	$n\alpha^n u[n]$	$\frac{z\alpha}{(z-\alpha)^2}$	$\|z\| > \|\alpha\|$
8	$\cos(n\Omega)u[n]$	$\frac{z^2 - z\cos\Omega}{z^2 - 2z\cos\Omega + 1}$	$\|z\| > 1$
9	$\sin(n\Omega)u[n]$	$\frac{z\sin\Omega}{z^2 - 2z\cos\Omega + 1}$	$\|z\| > 1$
10	$\alpha^n \cos(n\Omega)u[n]$	$\frac{z^2 - \alpha z\cos\Omega}{z^2 - 2\alpha z\cos\Omega + \alpha^2}$	$\|z\| > \|\alpha\|$
11	$\alpha^n \sin(n\Omega)u[n]$	$\frac{\alpha z\sin\Omega}{z^2 - 2\alpha z\cos\Omega + \alpha^2}$	$\|z\| > \|\alpha\|$

Table 17.2 Properties of the Two-Sided z-Transform

Entry	Property	Signal	z-Transform
1	Shifting	$x[n-N]$	$z^{-N}X(z)$
2	Reflection	$x[-n]$	$X\left(\frac{1}{z}\right)$
3	Anti-causal	$x[-n]u[-n-1]$	$X\left(\frac{1}{z}\right) - x[0]$ (for causal $x[n]$)
4	Scaling	$\alpha^n x[n]$	$X\left(\frac{z}{\alpha}\right)$
5	Times-n	$nx[n]$	$-z\frac{dX(z)}{dz}$
6	Times-cos	$\cos(n\Omega)x[n]$	$0.5\left[X(ze^{j\Omega}) + X(ze^{-j\Omega})\right]$
7	Times-sin	$\sin(n\Omega)x[n]$	$j0.5\left[X(ze^{j\Omega}) - X(ze^{-j\Omega})\right]$
8	Convolution	$x[n] \star h[n]$	$X(z)H(z)$