Table 3.4 : Some Common Z-transform Pairs

x(t)	x(n)	X(z) With positive power of z	X(z) With negative power of z	ROC
	$\delta(n)$	1	1	Entire z-plane
	u(n) or 1	$\frac{z}{z-1}$	$\frac{1}{1-z^{-1}}$	$\lvert z\rvert > 1$
	$a^n\, u(n)$	$\frac{z}{z-a}$	$\frac{1}{1-az^{-1}}$	$\lvert z\rvert > \lvert a\rvert$
	$n\, a^n\, u(n)$	$\frac{az}{(z-a)^2}$	$\frac{az^{-1}}{(1-az^{-1})^2}$	$\lvert z\rvert > \lvert a\rvert$
	$n^2\, a^n\, u(n)$	$\frac{az\,(z+a)}{(z-a)^3}$	$\frac{az^{-1}\,(1+az^{-1})}{(1-az^{-1})^3}$	$\lvert z\rvert > \lvert a\rvert$
	$-a^n u(-n-1)$	$\frac{z}{z-a}$	$\frac{1}{1-az^{-1}}$	$\lvert z\rvert < \lvert a\rvert$
	$-na^n\, u(-n-1)$	$\frac{az}{(z-a)^2}$	$\frac{az^{-1}}{(1-az^{-1})^2}$	$\lvert z\rvert < \lvert a\rvert$
$t\, u(t)$	$nT\, u(nT)$	$\frac{Tz}{(z-1)^2}$	$\frac{Tz^{-1}}{(1-z^{-1})^2}$	$\lvert z\rvert > 1$
$t^2 u(t)$	$(nT)^2 u(nT)$	$\frac{T^2 z\,(z+1)}{(z-1)^3}$	$\frac{T^2 z^{-1}\,(1+z^{-1})}{(1-z^{-1})^3}$	$\lvert z\rvert > 1$
$e^{-at} u(t)$	$e^{-anT} u(nT)$	$\frac{z}{z-e^{-aT}}$	$\frac{1}{1-e^{-aT}\, z^{-1}}$	$\lvert z\rvert > \lvert e^{-aT}\rvert$
$te^{-at} u(t)$	$nTe^{-anT} u(nT)$	$\frac{z\,T\,e^{-aT}}{(z-e^{-aT})^2}$	$\frac{z^{-1}\,T\,e^{-aT}}{(1-e^{-aT}\, z^{-1})^2}$	$\lvert z\rvert > \lvert e^{-aT}\rvert$
$\sin\Omega_0 t\, u(t)$	$\sin\Omega_0 nT\ u(nT)$ $= \sin\omega n\ u(nT)$ where, $\omega = \Omega_0 T$	$\frac{z\sin\omega}{z^2-2z\cos\omega+1}$	$\frac{z^{-1}\sin\omega}{1-2z^{-1}\cos\omega+z^{-2}}$	$\lvert z\rvert > 1$
$\cos\Omega_0 t\, u(t)$	$\cos\Omega_0 nT\ u(nT)$ $= \cos\omega n\ u(nT)$ where, $\omega = \Omega_0 T$	$\frac{z\,(z-\cos\omega)}{z^2-2z\cos\omega+1}$	$\frac{1-z^{-1}\cos\omega}{1-2z^{-1}\cos\omega+z^{-2}}$	$\lvert z\rvert > 1$

Note : 1. The signals multiplied by u(n) are causal signals (defined for $n \geq 0$).

2. The signals multiplied by u(−n − 1) are anticausal signals (defined for $n \leq 0$).