

ECE 3500: Fundamentals of Signals and Systems

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z-Transform Handout

z-Transform Pairs	
$x[n]$	$X(z)$
$\delta[n]$	1
$u[n]$	$\frac{1}{1 - z^{-1}}$
$u[n]a^n$	$\frac{1}{1 - az^{-1}}$
$u[n]na^n$	$\frac{az^{-1}}{(1 - az^{-1})^2}$
$u[n] \sin[\omega_0 t]$	$\frac{z^{-1} \sin \omega_0}{1 - 2z^{-1} \cos \omega_0 + z^{-2}}$
$u[n] \cos[\omega_0 t]$	$\frac{1 - z^{-1} \cos \omega_0}{1 - 2z^{-1} \cos \omega_0 + z^{-2}}$
$u[n]a^n \sin[\omega_0 t]$	$\frac{az^{-1} \sin \omega_0}{1 - 2az^{-1} \cos \omega_0 + a^2 z^{-2}}$
$u[n]a^n \cos[\omega_0 t]$	$\frac{1 - az^{-1} \cos \omega_0}{1 - 2az^{-1} \cos \omega_0 + a^2 z^{-2}}$
$x[n - M]$	$z^{-M} X(z)$
$nx[n]$	$-z \frac{d}{dz} X(z)$
$x[n] - x[n - 1]$	$(1 - z^{-1}) X(z)$
$\sum_{k=-\infty}^n x[k]$	$\frac{1}{(1 - z^{-1})} X(z)$
$x_1[n] * x_2[n]$	$X_1(z) X_2(z)$