Z-Transform' Properties

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Property	$ROC_x = \{\rho_r < \lvert z\rvert < \rho_l\}$	ROC
Linearity	$\sum_k \alpha_k (x_k[n]) \leftrightarrow \sum_k \alpha_k X_k(z)$	$\supseteq \cap_k ROC_{xk}$
Time shift	$x[n-n_0] \leftrightarrow X(z)\, z^{-n_0}$	ROC_x except for possible $z=0$
Time reversal	$x[-n] \leftrightarrow X(z^{-1})$	$\{\rho_l^{-1} < \lvert z\rvert < \rho_r^{-1}\}$
Multiplication by k^n	$x[n]k^n \leftrightarrow X(k^{-1}z)$	$\{\lvert k\rvert \rho_r < \lvert z\rvert < \lvert k\rvert \rho_l\}$
Convolution (time)	$x_1[n] * x_2[n] \leftrightarrow X_1(z)X_2(z)$	$\supseteq ROC_{x1} \cap ROC_{x2}$
Summation	$\sum_{m=-\infty}^{n} x[m] \leftrightarrow \frac{1}{1-z^{-1}} X(z)$	$\supseteq ROC_x \cap \{\lvert z\rvert > 1\}$
$\frac{d}{dz}$	$nx[n] \leftrightarrow -z\frac{dX(z)}{dz}$	ROC_x

$$x[n] * u[n] = \sum_{k=-\infty}^{+\infty} x[k] \cdot u[n-k]$$

$n-k \geq 0 \quad k \leq n$