

properties of the DTFT			DTFT pairs		
Property	Aperiodic signal	FT	signal	fourier tran	coefficients
	$x[n], y[n]$	$X(e^{j\omega}), Y(e^{j\omega})$ period of 2π	$k = -N/2 \dots N/2 - 1$ $N > \sum_k a_k e^{jk(2\pi/N)n}$	$(2\pi)k = -\infty \dots \infty$ $\sum_{-\infty}^{\infty} (a_k \delta(\omega - N/2\pi k))$	a_k
linearity	$ax[n] + by[n]$	$aX(e^{j\omega}) + bY(e^{j\omega})$	$e^{j\omega n}$	$(2\pi)L = -\infty \dots \infty$ $\sum_{-\infty}^{\infty} (\delta(\omega - \omega_0 - 2\pi l))$	$w_0 = 2\pi m/N$
time shifting	$x[n-n_0]$	$e^{-j\omega n_0} X(e^{j\omega})$			
frequency shift	$e^{j\omega_0 n} x[n]$	$X(e^{j(\omega - \omega_0)})$			
conjugation	$x^*[n]$	$X^*(e^{-j\omega})$			
time reversal	$x[-n]$	$X(e^{j\omega})$			
time expansion	$x(k)[n] = \begin{cases} x[n/k], & \text{if } n = \text{multiple of } k \\ 0, & \text{if } n \neq \text{multiple of } k \end{cases}$	$X(e^{jk\omega})$			
convolution	$x[n] * y[n]$	$X(e^{j\omega}) Y(e^{j\omega})$			
Multiplication	$x[n] y[n]$	$\frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{j\theta}) Y(e^{j(\omega - \theta)}) d\theta$			
difference in time	$x[n] - x[n-1]$	$(1 - e^{-j\omega}) X(e^{j\omega})$			
accumulation	$(k = -\infty \dots n) \sum x[k]$	$(1 - e^{-j\omega})^{-1} X(e^{j\omega}) + \pi X(e^{j0}) \delta(\omega - 2\pi k)$			
differentiation in frequency	$nx[n]$	$j \frac{dX(e^{j\omega})}{d\omega}$			