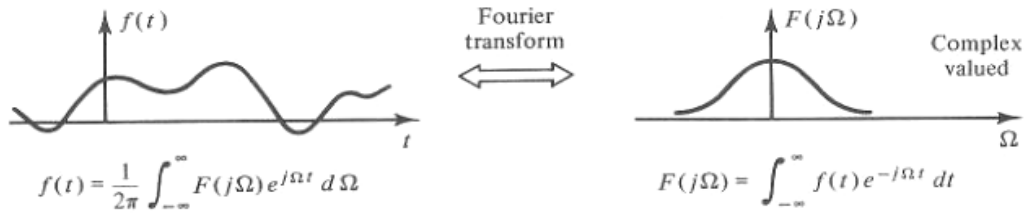


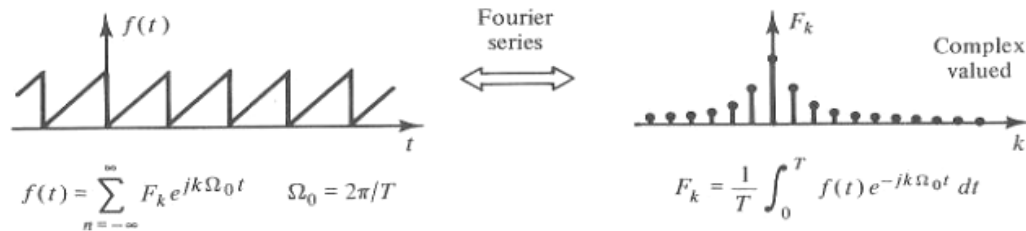
Time Domain

Frequency Domain

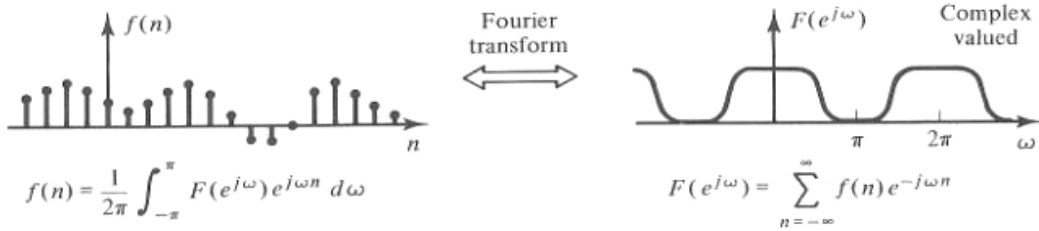
NONPERIODIC CONTINUOUS-TIME



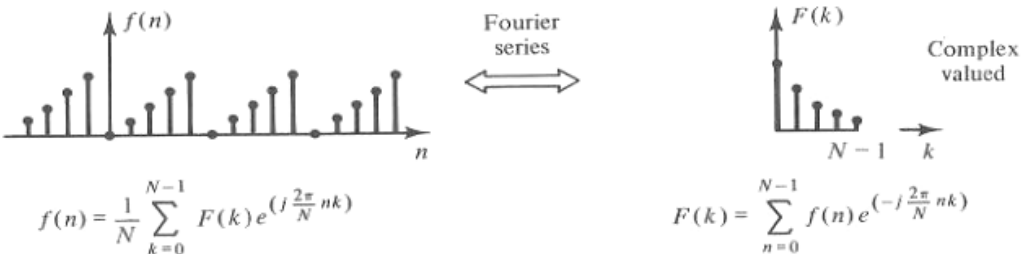
PERIODIC CONTINUOUS-TIME



NONPERIODIC DISCRETE-TIME



PERIODIC DISCRETE-TIME

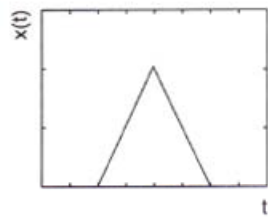


FIXED LENGTH DISCRETE-TIME

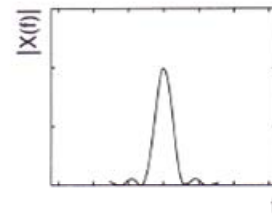


Where $[\Omega : \text{digital frequency}]$ ($\omega : \text{continuous frequency}$)

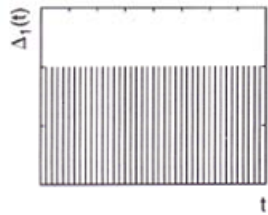
	Time domain	Frequency domain
Fourier Transform pair (FT)	$x(t) = \int_{f=-\infty}^{\infty} X(f) e^{j2\pi ft} df$	$X(f) = \int_{t=-\infty}^{\infty} x(t) e^{-j2\pi ft} dt$
Fourier Series pair (FS)	$x(t) = \sum_{k=-\infty}^{\infty} X_k e^{\frac{j2\pi kt}{T}}$	$X_k = \frac{1}{T} \int_0^T x(t) e^{-\frac{j2\pi kt}{T}} dt$
Discrete time Fourier Transform (DTFT)	$x[n] = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(\Omega) e^{j\Omega n} d\Omega$	$X(\Omega) = \sum_{n=-\infty}^{\infty} x[n] e^{-j\Omega n}$
Z transform only (ZT)		$X(z) = \sum_{n=-\infty}^{\infty} x[n] z^{-n}$
Discrete Fourier Series pair (DFS)	$x[n] = \frac{1}{N} \sum_{k=0}^{N-1} X[k] e^{\frac{j2\pi kn}{N}}$ $n = 0 \sim N-1$	$X[k] = \sum_{n=0}^{N-1} x[n] e^{-\frac{j2\pi kn}{N}}$ $k = 0 \sim N-1$
Discrete Fourier Transform pair (DFT)	$x[n] = \frac{1}{N} \sum_{k=0}^{N-1} X[k] e^{\frac{j2\pi kn}{N}}$ $n = 0 \sim N-1$	$X[k] = \sum_{n=0}^{N-1} x[n] e^{-\frac{j2\pi kn}{N}}$ $k = 0 \sim N-1$



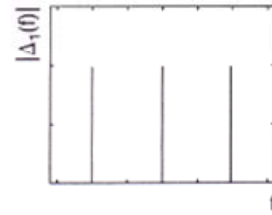
(a)(i) Analog Signal



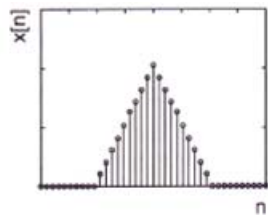
(ii) Fourier transform



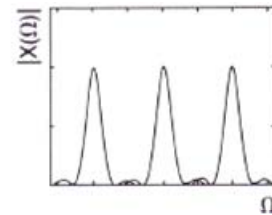
(b)(i) Time Sample Train



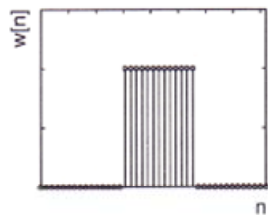
(ii) Spectrum of Time Sample Train



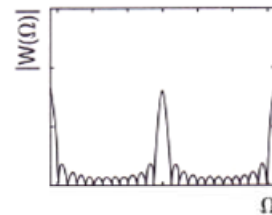
(c)(i) Sampled Signal



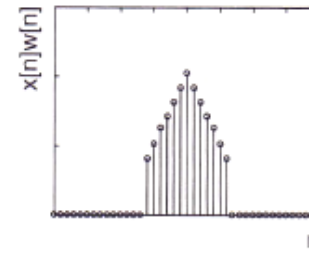
(ii) DTFT



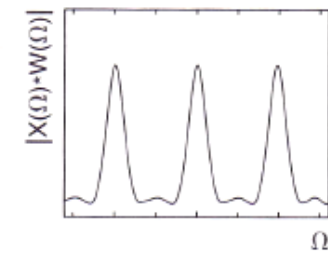
(d)(i) Window Function



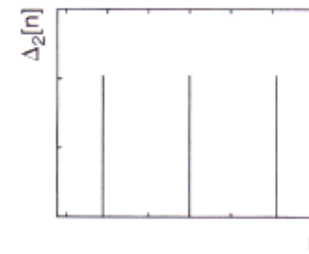
(ii) DTFT of Window



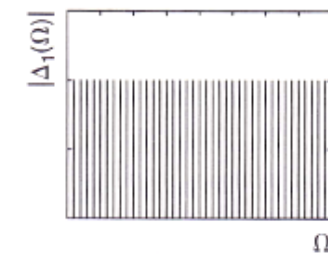
(e)(i) Window Signal



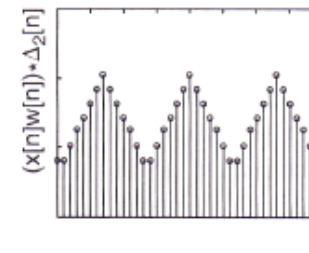
(ii) DTFT of Windowed Signal



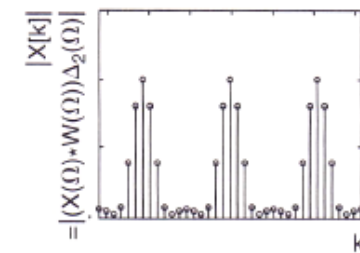
(f)(i) Frequency Sample Train



(ii) Spectrum of Frequency Sample Train



(g)(i) IDFT



(ii) DFT