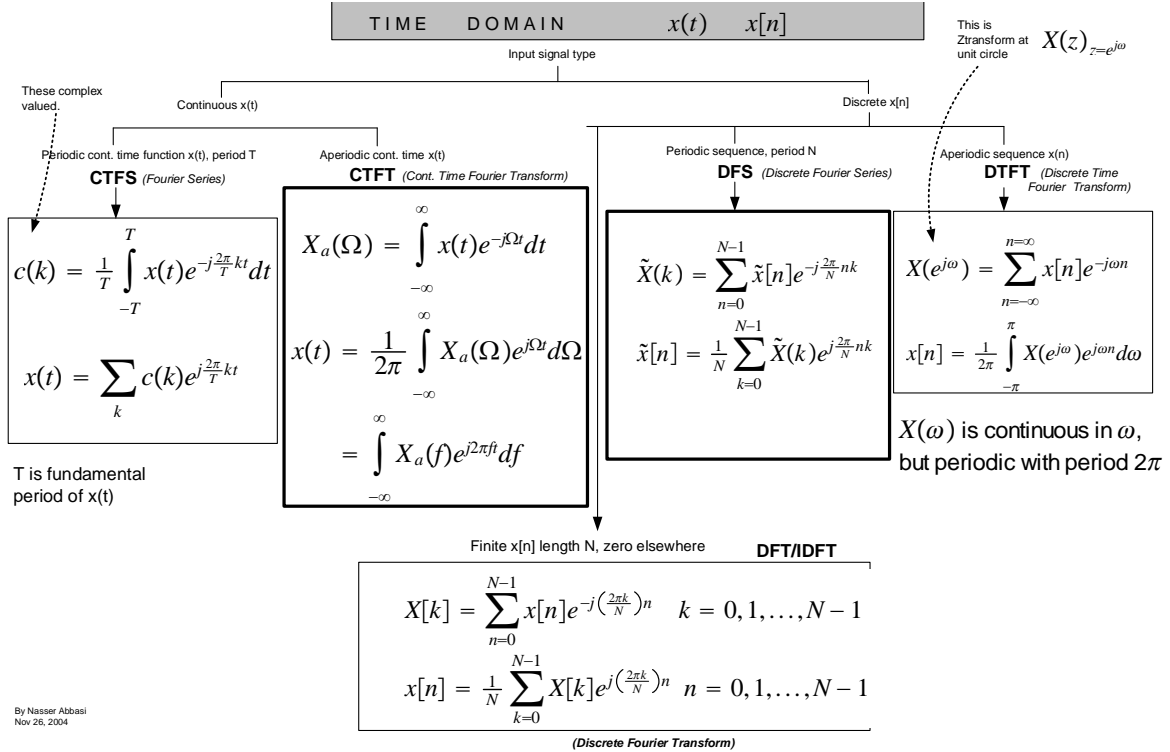


different transforms used in signal processing

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Note: Ω measured in rad/sec is the radian frequency used for the continuous time case.
 ω measured in radians only (not radians/sec) and is the radian frequency used for the discrete time case.
 f is in Hz (cycles per second) for continuous time case and in cycles per sample for the discrete time case



The book signals and systems by Oppenheim, Willsky, Young, also has a nice diagram, here is pic of it

TABLE 5.4. SUMMARY OF FOURIER SERIES AND TRANSFORM EXPRESSIONS

	Continuous-time		Discrete-time	
	Time domain	Frequency domain	Time domain	Frequency domain
Fourier Series	$x(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_0 t}$ continuous time periodic in time	$a_k = \frac{1}{T} \int_{T_0} x(t) e^{-jk\omega_0 t} dt$ discrete frequency aperiodic in frequency	$x[n] = \sum_{k=-\infty}^{\infty} a_k e^{jk(2\pi/N)n}$ discrete time periodic in time	$a_k = \frac{1}{N} \sum_{n=-\infty}^{\infty} x[n] e^{-jk(2\pi/N)n}$ discrete frequency periodic in frequency
Fourier Transform	$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega) e^{j\omega t} d\omega$ continuous time aperiodic in time	$X(\omega) = \int_{-\infty}^{\infty} x(t) e^{-j\omega t} dt$ continuous frequency aperiodic in frequency	$x[n] = \frac{1}{2\pi} \int_{2\pi} X(\Omega) e^{j\Omega n} d\Omega$ discrete time aperiodic in time	$X(\Omega) = \sum_{n=-\infty}^{\infty} x[n] e^{-j\Omega n}$ continuous frequency periodic in frequency