

Fourier transform

Discrete-time Fourier transform

$$x[n] \leftrightarrow X(e^{j\Omega})$$

$$X(e^{j\Omega}) = \sum_{k=-\infty}^{\infty} x[k] e^{-j\Omega k}$$

$$x[n] = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{j\Omega}) e^{j\Omega n} d\Omega$$

Continuous-time Fourier transform

$$x(t) \leftrightarrow X(j\omega)$$

$$X(j\omega) = \int_{-\infty}^{\infty} x(t) e^{-j\omega t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(j\omega) e^{j\omega t} d\omega$$

Properties of Fourier transforms

- If the real part of a Fourier transform is even, and the imaginary part is odd, then the time-domain signal is real.
- If a Fourier transform is continuous, then its corresponding signal is absolutely summable.
- If a Fourier transform is purely imaginary, then its time-domain signal is odd.

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