Fourier Series: identified with mathematical analysis of periodic phenomenon

Fourier Transform: "limiting case of F.S.". concerned with analysis of nonperiodic phenomenon

- Analysis:
  - break up a signal into simpler constituent parts
- Synthesis:
  - reassemble from constituent parts

} Fourier Analysis

→ accomplished by linear operations (sum, integral)

- **Periodic phenomenon & F.S.**

periodic
- in time (eg. harmonic motion) → frequency ν
- in space: some physical quantity distributed in region with symmetry. the region repeats periodicity arises from the symmetry of the region (eg. heart top)

Fourier analysis is often associated with symmetry

→ period, wavelength

$v = \lambda \nu$ for wave: reciprocal relationship between spacial and frequency domain

$\sin(t+2\pi) = \sin t$

$\cos(t+2\pi) = \cos t$

→ periodicity comes from the symmetry of the unit circle