17 Interim Review

17.1 Fourier Series/Transform/Integrals

- orthogonality of eigenfunctions of the S-L problem → orthogonality of trigonometric system → Euler formulas for the Fourier series
- odd/even → Fourier sine/cosine series, Half-range expansion
- extension to nonperiodic functions → Fourier integral
- Fourier transform (sine/cosine)

17.2 Partial Differential Eqns

- ODE vs. PDE
- 1/2/3-dimensional wave/heat/Laplace Eqns
- Initial/boundary conditions
- Separating variables :turn PDE into ODE
- These ODEs yield infinitely many solns (**eigenfunctions** and the corresponding **eigenvalues**)
  ex. shape and frequency of the vibration
- Total solution = infinite series of eigenfunctions , whose coefficients are **Fourier coeff** !