

Lecture 43

Office Hrs: M, T, Th 2-3 pm

Final Exam Wed, May 3, 1-3 pm here in REC 121.

One two sided hand-written crib sheet allowed.

Closed books, closed notes, no electronics.

Topics Solving the vibrating string of length L problem: Separation of variables and D'Alembert's method.

Fourier series on $[-\pi, \pi]$ of form

$$a_0 + \sum_{n=1}^{\infty} (a_n \cos nx + b_n \sin nx) \text{ and } \sum_{n=-\infty}^{\infty} \hat{f}(n) e^{inx}$$

Best L^2 approximation among trig polys fact.

Parseval's Thm for Fourier Series and Bessel's inequality for orthogonal functions.

Féjér's Theorem and the Weierstraß Approximation Theorem

The Dirichlet and Féjér kernels.

Facts about convergence of Fourier Series.

Important integrals to know how to do:

$$\int x \cos nx \, dx, \int x \sin nx \, dx, \int x e^{inx} \, dx.$$

Fourier Transform and Inversion Formula on $\mathbb{R}$.

Basic facts about Fourier Transform, Plancherel Id.

Fourier Series and Transform facts about even and odd functions.

Fourier Sine series on $[0, \pi]$ is the F.S. for odd ext to $[-\pi, \pi]$.

Solving the heat problem on $\mathbb{R}$ via the Fourier Transform and on $[0, L]$ via Fourier Series.

~~Sturm-Liouville Problems.~~

Harmonic functions and the Dirichlet Problem.

Maximum principle and the averaging property.