Math 110.417
Partial Differential Equations

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Course Introduction

1. Syllabus Course Webpage
   - Office hours
   - HWs (11), Quizzes (11), Exams (2): GradeScope
   - DRP, Youtube videos, AI tools (ChatGPT)
2. Contents

Contents

Equations:

- Heat equation
  - IBVP, equilibrium, fundamental solutions, maximum principles
- Laplace equation
  - Sturm-Liouville eigenvalue problems, Green's functions, Poisson's formula, maximum principles, potential theory
- Wave equation
  - Cauchy problem, domains of influence and dependence, Poisson's solution, energy inequalities

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Methods:

- separation of variables and expansions of solutions
- Fourier series (bounded domain)
- Fourier transform (infinite domain)
- Green's function / Method of characteristics
- Laplace transform (optional)

Philosophy: formulation, solution, and interpretation

PDEs: equations containing partial derivatives.
Notations:

Variables	x space, t time
Derivatives	$\partial_t u := \frac{\partial u}{\partial t}, \partial_x u := \frac{\partial u}{\partial x}$

Review: solving ODEs