

## MATH 241 — HOMEWORK 4.

due on Friday, October 2.

**Textbook:** “*Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*”, fifth edition

by Richard Haberman

### Topics:

- Chapter 2. Method of Separation of Variables
  - 2.3 Heat Equation with Zero Temp. at Finite Ends
    - \* (2.3.2) Separation of Variables
    - \* (2.3.3) Time-Dependent Equation
    - \* (2.3.4) Boundary Value Problem
    - \* (2.3.5) Product Solutions and Superposition
    - \* (2.3.6) Orthogonality of Sines
  - 2.4 Worked Examples
    - \* (2.4.1) Heat Conduction in a Rod with Insulated Ends
    - \* (2.4.2) Heat Conduction in a Thin Insulated Circular Ring
    - \* (2.4.3) Summary of Boundary Value Problems
  - 2.5 Laplace’s Equation: Solutions and Qualitative Properties
    - \* (2.5.1) Laplace’s Equation Inside a Rectangle
    - \* (2.5.2) Laplace’s Equation Inside a Circular Disk

### Fourth Homework Assignment.

#### *Reading:*

- Read Sections 2.4.1, 2.4.2, 2.4.3, 2.5.1 and 2.5.2 from the book.
- Read your notes.

#### *Exercises:*

**Problem 1.** Solve Problem 2.4.7 (b), by taking the solution you got in Problem 2.4.2 and flipping it along the  $x = L/2$  axis. Explain why you may do this.

**Problem 2.** Write down the explicit formulae for the change of variables that give you  $u_1, u_2$  and respectively  $u_3$  in (2.5.6) (Page 67), from  $u_4$ .

#### **Problems:**

- Page 65: problems: 2.4.1 (b), 2.4.2
- Page 81: problems: 2.5.1 (e), 2.5.4, 2.5.5 (a),(c), 2.5.8 (a)