MATH 241 — HOMEWORK 12.

due on Friday, April 14.


Topics:
• Chapter 8. Nonhomogeneous Problems
  – 8.2 Heat Flow with Nonhomogeneous Conditions.
  – 8.3 Method of Eigenfunction Expansion, Differentiation of Series
  – 8.4 Method of Eigenfunctions Expansion Using Green’s Formula
  – 8.6 Poisson’s Equation

Twelvth Homework Assignment.

Reading:
• Read Sections 8.3, 8.4 and 8.6 from the book.

Exercises:

Problem 1. Solve the Heat Equation in a one dimensional rod (0 < x < 1):
\[ \frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}, \]
subject to the boundary conditions
\[ u(0, t) = 0, \quad u(L, t) = e^{-kt}, \]
t > 0, and initial condition \[ u(x, 0) = 0. \]
(Hint: Note that \[ \frac{\sin(x)}{\sin(1)}e^{-kt} \] is a particular solution of the Heat Equation and the boundary conditions).

Problem 2. Redo Problem 2. using the method of eigenfunction expansion.

Problems:
• Page 346: problems: 8.2.4
• Page 352: problems: 8.3.1, 8.3.2, 8.3.3, 8.3.6
• Page 371: problems: 8.6.1, 8.6.3, 8.6.6

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