

Numerical Partial Differential Equations 1

Homework 1

(Due: Oct. 25, 2006)

1. Problem 1
Chapter 1, page 4, Example 1.1

2. Problem 2
Chapter 1, page 8, Exercise 1.1

3. Problem 3
Chapter 2, page 37, Exercise 2.2

4. Problem 4
Chapter 2, page 37, Exercise 2.3

5. Problem 5
Use (2.10) to write a program to solve the boundary value problem using the direct solver, cg method and inverse matrix:

$$u''(x) = f(x) \quad \text{for } -1 < x < 1 \quad (1)$$

$$u(-1) = \alpha, \quad u(1) = \beta. \quad (2)$$

Solve the problem with various grid sizes and the conditions below

- $f(x) = 2, \alpha = \beta = 1$
- $f(x) = 12x^2, \alpha = \beta = 1$
- $f(x) = e^x, \alpha = e^{-1}, \beta = e^1$

Discuss the results.