Name ________________________ Score __________________

MATH 581 - Fall 2004 - Homework 3

Carefully Read and Follow Directions Clearly label your work and attach it to this sheet. No credit will be given for unsubstantiated answers.

1. In Homework 1, you gave an analytical solution to the following problem, and you gave an explicit scheme for numerically approximating the solution to the pde. Use Fourier Analysis to derive a stability condition for this problem. (continue to assume $\epsilon > 0$)

$$\begin{aligned} u_t &= \epsilon u_{xx}, \quad x \in (0,1), t > 0 \\ u(x,0) &= \sin 2\pi x, \quad x \in [0,1] \\ u(0,t) &= u(1,t) = 0, \quad t \geq 0. \end{aligned}$$

2. Exercise 2.6 on page 57 of your textbook. (ask me if you need some direction)

3. Exercise 2.7 on page 57 of your textbook. (ask me if you need some direction)

4. Implement the Crank-Nicolson method for the example used in Figure 2.2 of your text. Note that this is the same initial condition you used for Homework 2. In addition, download and use the m-file *trisys.m* for the linear system solve required at each time step of this implementation.