Ma 405: Introduction to Computational Mathematics
Reading and Homework Assignment 10

Prof. Wickerhauser

You are allowed to collaborate with one other person on homework, but then you must indicate both contributor's names on your solution sheet.

You are also encouraged to work additional exercises from the indicated sections, although the homework grade will be based only on the exercises listed below.

Please return your solutions to me by the end of class on the due date. **Late homework will not be accepted.**

Read Chapter 6, sections 6.1 and 6.2

P.186, Exercises 6.1.

6.1.5

P.193, Exercises 6.2.

6.2.2, 6.2.5

Extra problem 1. Use natural cubic splines to interpolate the function $\sin 2\pi x$ at the points $x = 0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1$. Give an estimate for the maximum error between the spline and the function.

Extra problem 2. Use Galerkin's method with $\phi_n(x) = \sin n\pi x$ and $n = 1, 2, 3, 4$ to solve the boundary value problem $y'' = 1$ on $(0, 1)$; $y(0) = y(1) = 0$. That is, write the linear system you must solve to find the solution in terms of $\{\phi_n\}$. Solve the system and compute the maximum error between the approximate solution and the exact solution $y(x) = \frac{x(x-1)}{2}$.