Ma 405: Introduction to Computational Mathematics
Reading and Homework Assignment 11

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 6.3 and 6.4

P.201, Exercises 6.3.

6.3.1, 6.3.5, 6.3.7

P.209, Exercises 6.4.

6.4.4

Extra problem 1. Note that $\int_1^2 \frac{dx}{x} = \log 2$. Use the composite Newton-Cotes formula of your choice with an appropriate h to compute $\log 2$ to within 10^{-10}.

Extra problem 2. Use Galerkin's method with linear B-splines ("hat functions") centered at $x = \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}$ 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 piecewise linear solution. Solve the system and compute the maximum error between the approximate solution and the exact solution $y(x) = \frac{x(x-1)}{2}$.