HOMEWORK
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November 30, 2016

Please answer the following questions in complete sentences by Thursday, 2016-12-15 at 3pm.

Homework Extra

My policy on these questions is different from the usual homework grading. I will tend to give one of three scores: full points, half points or zero points.

A full points solution will be a well-articulated, well presented solution that gets at all the important and relevant issues.

A half points solution is correct, but is lacking in presentation details and/or misses a minor aspect of the problem.

A zero point solution may get some ideas or pieces of the solution right but is missing major components.

In order words, don't do the extra credit unless you want to do a good job at writing up and presenting the solution. It will not be easy to get full points and I will be picky.

Problem 0: Collaboration

There is no collaboration allowed on this assignment. None, nada, zero. You must answer the following question, which is worth one point, multiplicatively applied on your entire extra credit. There is only one acceptable answer.

Please report the people you worked with on this assignment.

Problem 1: Boundary value problems (20 points)

Complete all parts of Chapter 13, Problem 2 in Julia.

Problem 2: A tridiagonal solver (20 points)

Consider a system of linear equations $\boldsymbol{A}\mathbf{x} = \mathbf{b}$ where $\boldsymbol{A}$ is tridiagonal:

$$\boldsymbol{A} = \begin{bmatrix} A_{11} & A_{12} & 0 & \dots & 0 \\ A_{21} & A_{22} & A_{23} & \ddots & \vdots \\ 0 & A_{32} & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & \ddots & A_{n-1,n} \\ 0 & \dots & 0 & A_{n,n-1} & A_{n,n} \end{bmatrix}$$

Describe, develop, implement, and test a piece of software to solve these systems of equations using LU with partial pivoting in time that is $O(n)$, where n is the dimension of the system. Your solver should be well documented so that it is clear how your code maps to your algorithm and also how I would use your code.

This problem must include an ipython notebook or julia file that will reproduce your timing results on a new computer that I can run for myself.

Problem 3: Polynomial Interpolation (20 points)

Write a Julia program that will output nicely formatted LaTeX representations of the Lagrange interpolating polynomial as $O(n^2)$ terms and the monomial representation of that same interpolating polynomial.

Find a 30 to 50 point set of data with 5-6 digits used for each number and show your results. Your data should be compelling.