

AME 20214

Homework 1

Due: Thursday, 30 August 2012, in class

1. Write and execute a **Fortran** program which prints to the screen,

Hello World! My name is *your name here*.

Give a hard copy of your source code and output.

2. Take the dimension of the matrix **A** to be $N \times N$ and use a variety of software programs to initialize all of the elements of the matrix. Let the (i, j) element of **A** be defined by the sum $i + j$. So if $N = 3$,

$$\mathbf{A} = \begin{pmatrix} 1+1 & 1+2 & 1+3 \\ 2+1 & 2+2 & 2+4 \\ 3+1 & 3+2 & 3+3 \end{pmatrix} = \begin{pmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{pmatrix}.$$

Build **A** with two different software tools: 1) **Matlab** and 2) **Fortran**. Plot on a single graph using log-log axes the computational time versus N for as large a domain of N as is feasible for each method. Make your programs as simple as possible, but try to ensure that you have run a fair test. That is to say, make each program have similar structure and operations. To measure the computational time, you can examine the updated online course notes and use intrinsic timing tools in each package or just use a stopwatch (or if N is large and you are patient, a calendar!) Include a hard copy of your source code and any output you deem necessary. Note it is not necessary to print the large matrices!

Be sure to follow the homework format specified in the course syllabus. In particular, you should write in words any explanations and interpretations which will help show your understanding of the problem. This might be minimal for problem 1.