

AME 20214

Homework 1

Due: Thursday, 3 September 2015, 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. The following Fortran code will generate a finite set of points which are part of the cubic

$$y = x^3, \quad \text{for } x \in [0, 2].$$

```
program cubic                                ! beginning of the program
!
! J. M. Powers, AME 20214, August 2015
!
! this program generates points on a cubic
!
implicit none                               ! force all variables to be declared
integer :: i                                ! declare i to be an integer
integer, parameter :: n = 20                ! give the number of points
real :: x(n),y(n)                           ! declare the arrays x and y to be of length n and real
real :: dx                                   ! declare dx to be real
real, parameter :: xmin =0.,xmax=2.         ! set values for xmin and xmax
open(unit=20,file='cubic.out')              ! open an output file
dx = (xmax-xmin)/(n-1.)                     ! calculate dx
do i=1,n                                     ! do loop
  x(i) = xmin + dx*(i-1.)                   ! calculate x
  y(i) = x(i)**3                             ! calculate y
  print 100,x(i),y(i)                       ! print x and y to the screen
  write(20,100) x(i),y(i)                   ! write x and y to 'cubic.out'
enddo                                        ! end of the do loop
100 format(f10.6,2x,f10.6)                  ! format the output
end program cubic                            ! end of program
```

On the Notre Dame Linux system, create a .f90 file with the above program, except you will modify it to remove my name and include yours. Cut and paste the output into MATLAB, and generate a plot of  $y(x)$  for  $x \in [0, 2]$ . Optional: If you like, you could also read ahead from Sec. 6.3 of the course notes and learn how to directly import the data into MATLAB. It is easy and useful. Review Sec. 1.5 of the online course notes for guidance in plot preparation. It is important that your font size be both readable and of similar size, neither smaller nor larger, than the main text. Note that MATLAB's default font size is usually too small. Because you are simulating a continuous curve, your plot should not have any "dots" or "open circles." It should simply be a continuous curve. Include a hard copy of your source code and its numerical output.

For this course, efficiency and neatness of homework is important. For this homework, there is a *three page maximum page limit*, and MS Word or equivalent typesetting is required. *Brief* words of explanation in sentence form are necessary to receive full credit. Be sure to follow the homework format specified in the course syllabus.