AME 20214
Homework 11
Due: Thursday, 4 December 2014, in class

1. (30) Consider Problem 1 from Homework 3. Obtain an approximate solution for $y(t)$ from four languages, with $\Delta t = 0.02$ s, $t \in [0, 10 \text{ s}]$.

   (a) `Fortran 77`,

   (b) `C`,

   (c) `Microsoft Excel`, and

   (d) `VBA`

   Report for each of the four codes a single numerical value of the error in the approximation of $y(t)$ at $t = 10$ s for each of the four languages. No plots are necessary for this homework, though you may wish to explore on your own how to create them in `Excel`. Provide source code for each language in your report. Because `Microsoft Excel` has no easily identified source code, you can provide a screen shot similar to that found in the course notes of your spreadsheet. Because the `Excel` "code" could be lengthy, you need only give a screen capture of the first ten or twenty lines.

2. (20) Following the procedure outlined in Chapter 23 of the course notes, write a `Fortran 90` function subroutine to evaluate the Taylor series expansion of $\sinh x$ about $x = 0$ with seven non-zero terms. Process this subroutine with the `f2py Fortran` to `Python` software, and demonstrate its execution within the `Python` environment much as done in Chapter 23. Include a copy of your subroutine as well as a listing of the `Python` operations to approximate sinh(3).

Prepare your homework using the LaTeX text processor, include at least one equation, and adhere to a *four page maximum*. 50 points for æsthetics. 50 points for technical merit.