AMAT3132 – Numerical Analysis, Winter 2010

Home work 4
(show all works)

Due Monday March 15, 2010 by 24:00 in the drop box#40
Late assignments are considered as missed work
Full marks 30

Instruction:

- Please hand in the report into the box #40 located next to Math general office in HH.

- The first page of the report must include your student information, and a list of people/resources whom (if) you got help from. Examples of people whom you have discussed are your course instructor, your classmates, or any other people. Example of resources are books other than texts for this course, web sites etc.

- You are permitted to discuss each other or people outside the class. However, your matlab code and all results must be authored by yourself.

- Please submit your matlab code electronically using the "submit assignment" utility.

- You must have either one executable **.m** matlab script for the entire assignment - such as the template for this course or you must have one main code that should run and verify your results. If your code does not run, you will be penalized accordingly.

1. [10] Determine all roots in the specified interval for each of the following equations using bisection method with tolerance 10^{-5}. For each case, report the initial interval, the total number of iterations, approximate solution x^*, and $|f(x^*)|$.

   (a) $f(x) = x + 3\cos x - e^x, \quad x \in [-4, 4]$.

   (b) $f(x) = e^x - 2 - \cos(e^x - 2), \quad x \in [-4, 4]$.

   (c) $f(x) = e^x + 2^{-x} + 2\cos(x) - 6, \quad x \in [-4, 4]$.

2. [10] Find positive real roots of the above equations using newton method using the tolerance 10^{-5}. For each equations, report the initial guess, the total number of iterations, approximate solution x^*, and $|f(x^*)|$.

3. [10] Solve each equation with a tolerance 10^{-10} for the positive real root in the given interval. Present semi-logarithmic plots for $|f(x^*)|$ as a function of the number of iterations to compare these two methods in one frame. (You will have three figures.) Use legend with different line types/colors to distinguish different curves.