MA/CS 321:001
MWF 11:00–11:50
FB 213
Fall 2004

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Announcements.

1. I hear rumors that matlab is available in Young Library. Details to follow.
2. I will plan to be in CB 313 on Friday, 24 September 2004 at 12 noon in order to answer questions about matlab. If students prefer another time, please let me know and I will see if we can accommodate one another.
3. The exam will be on Wednesday, 29 September 2004 and will cover through section 3.2.
4. If your matlab code looks right to you, but it will not run, please feel free to send the file to me by e-mail (it would be helpful if you cut and pasted error messages, also). There is a small chance I can identify the error and if so I will reply by e-mail.

Homework 4. Due Monday, 27 September 2004.

1. (20 points) Carry out Newton's method for the following functions and initial guesses. Comment on what you observe in each case.

   Use the example for the square root from Lecture 7 (see http://www.math.uky.edu/∼rbrown/courses/ma321.f.04/) that was handed out on Wednesday, 15 September 2004.

   For each example, please hand in the m-file, the 15 or so iterates, the error and a sentence commenting on the convergence. Since we do not know the exact root for the first example, you may use your last iterate as a proxy for the exact root. In the second and third examples, it should be easy to see a root.

   Recall that you will want to issue the matlab command `format long e` in order to encourage matlab to print all of the digits of your answer.

   (a) Approximate a root of $xe^x = 2$ using 0 as the initial guess.
   (b) Approximate a root of $x^3 - 3x^2 + 3x - 1 = 0$ using 2 as the initial guess.
   (c) Approximate a root of $\frac{5x}{1+x^2}$ using $x = 2$ as the initial guess.

   It is simplest to type the expression for Newton's method into your m-file. An energetic student might try to pass functions for $f$ and $f'$ to a general purpose routine. See the examples from Lecture 6 on the bisection method to find out how this is done.

2. §3.2 # 23.

3. §3.2 # 33. Follow the argument presented in class for studying the convergence of Newton's method. Introduce the derivative $f'(x_0)$ by adding or subtracting $f'(x_0)(r - x_n)$ to both sides. (Hint: you may determine the rate of convergence experimentally by trying some examples in matlab.)

4. Extra credit opportunity. Up to five homework points (and the gratitude of your classmates) will be given to the first person to identify and describe each error in my homework assignments and example files. Submit errors by e-mail.

September 16, 2004