Math 222 Fall 2002—HW #2 Due: Fri. Sep. 20

Reading (from Cheney and Kincaid):

Ch. 6, pp. 240–245, 249–250, 254–256.

Ch. 3, pp. 90–99, 102–109.

Problems (careful: don't do the "Computer Problems"):

1. Consider the system of 2 linear equations:

$$\begin{aligned} 10^{-5}x + y &= 3 \\ x - \frac{1}{3}y &= -\frac{1}{3} \end{aligned}$$

Compute the exact solution (we did this in class; you can just cite the result without proof). Compute the solution as computed on the `LUCKY-7` computer by naive Gaussian elimination (we did this in class; you can just cite the result without proof). Compute the solution as computed on the `LUCKY-7` computer by naive Gaussian elimination if the order of the two equations is first swapped. Compare the accuracy of the two approximate solutions.

2. §6.1, # 5 (p. 251).

3. §3.2, # 1 (p. 113).

4. Use the result of Problem 3 to compute the first 4 steps of Newton's method to solve $x^2 = 2$, starting at $x_0 = 1$. Compute the first 4 steps of the solution of $x^2 = 2$ by bisection, starting with $a = 1$, $b = 2$. Compute the first 4 terms of the Taylor series approximation to $\sqrt{2}$, using the result of Problem 1 on the last HW. Compare the accuracy of these three approximations.

5. §3.2, # 19 (p. 115). Hint: You can figure out *exactly* the range of starting values that give convergence. Sketch the graph of f and consider its tangent lines).