Math 370	**Numerical Analysis**	MWF 2:30-3:25
Spring 1997		127 Fowler

Point Distribution (N=16)

Range	92+	88+	82+	79+	76+	70+	70-
Grade	A	A-	B+	B	B-	C+	C
Frequency	3	2	1	2	3	4	1

Comments

Overall Your final score on the exam ended up being a straight average of your score on the in-class exam and the take-home exam. Then I did a bit of a curve on the final result. Come see me if you have questions about the exam. Do **not** come see me if you are going to grovel for more points. You have an exam this Friday. Concentrate on getting more points in the future. Exam 1 is now behind us!

#1 This was the problem which was most like the assessments. Most people did quite well on finding the **rate** of convergence. Also, most people were able to compute how many iterations each sequence took to reach the criterion (don't forget N must be an integer so one must round UP). Then when they were computing the order of convergence they were convinced the two must have different orders, forgetting completely that it's possible for two methods of the same order to converge at different rates, if they have different asymptotic rate constants.

#2 I confess that this problem was NOT written in the most straightforward way. The basic idea of the problem is to get you to realize that the function $f(x)$ that we are always trying to find fixed points or roots of does not HAVE to be an explicit function, but could be an integrally-defined function. You can still differentiate such functions, thus you can still use Newton's Method to find its root. Geometrically, it was interesting because the value of b is the number where the apparently infinite negative area "above" the $\ln(x)$ curve is cancelled out by the positive area "below" the $\ln(x)$ curve.

#3 Just want to make sure that you can read PSEUDOCODE and know what it means. This was clearly False Position because of the bracket-check condition. The second part of the question where you discuss whether this algorithm will work was fascinating. What I wanted to see is what kind of thought you had put into the notion of "converging to a root" or "finding an answer". The idea of converting one's casual mental image of a concept or process into **precise, unambiguous** language is an important one which you will have to do in many aspects of whatever career you choose. Communication is one of the most valued skills a person can have. Mathematics is all about communicating concepts in a specific rigorous manner. We will do more of this on future tests and assessments.

#4 If you have a graphical understanding of what Newton's Method does to produce a root then Lazy Newton's method is clearly understandable. The rest of the question is to see how deeply you understand the concept of **functional iteration**. We had shown that a number of the methods we used reduced to repeated executions of steps which look like $p_{n+1} = g(p_n)$, which we named Picard Iteration. Step 1 is being able to make this identification. Step 2 is about using our derivation of order of convergence of these Picard's iterations to show that our specific iterative method called Lazy Newton's method must be linear because for all non-trivial inputs, $|g'(p)|$ will be nonzero.