Numerical Analysis Questions & Answers

Question by Student 201427128

professor, I'm sorry to repeat the same question.
A2#6(a) ask about the number of iteration up to 4 significant digits.
the number of iteration will different if the initial guess is different.
I think it's possible that each person has a different answer.
Is there a proper way to set the initial guess?

I see what you mean. True, the number of iterations depends not only on the initial guess, but also on the values given to the previous guesses for the root (i.e. x_{-1} and x_{-2}). This may affect slightly the number of iterations needed to reach convergence. But for fastest convergence generally choose values for x_{-1} and x_{-2} that are very close to x_0. But even if you choose values for x_{-1} and x_{-2} that are not very close to x_0, I won't take away points. When correcting the exams, I will look at the logic, not the answers only. Good question: 1.0 bonus point more.

Lastly, please stop using the double backslash character when writing your posts (the "\\"). This makes your post very hard to read. In English, simply write what you want to say within one paragraph (one paragraph = one idea = one question). Don't break lines.

Question by Student 201727153

Professor, I have a question about #6(b) in Assignment 3. Since every row needs work to be done at least 1 division, the range of n, isn't it from 1 to N?

I'm not sure what you mean and I can't find 6b. Please formulate your question better.

Question by Student 201727153

Sorry, I wrote it wrong. Problem #4(b) in assignment 3, it is written that the range of n is from 1 to N-1. However, we have to do the work to all the rows at least 1 division. So, is the range of n from 1 to N?

I'm still not sure what you mean. You need to explain this better. What do you mean by 1 division? division of what by what? You need to be more clear.

Keep in mind that if such a question is asked in the exam, I will give almost all the points for the quality of the explanation, not for the answer itself. How well

you explain your steps and the quality of the logic is what matters the most.

Question by Student 201427128

Professor, I have a question about #3(b) in Assignment 4. Consider, $|\epsilon_{n+1}| = k|\epsilon_n|^p \rightarrow |x_{n+1} - \eta| = k|x_n - \eta|^p$*. to get the order of convergence* p*, I have to know* η *and* k*. how can I get the* η *and* k*? or Is there another way to get order of convergence? I need help.*

In this case, you have to find the order of convergence using the results obtained in (a). That is, don't derive an analytical expression for p, but find p from the results. Hint: p may change as the solution progresses towards the root. You can find the root (needed to evaluate the error) through the results as well. Good question: 2 points bonus.

Question by Jaehyuk

Professor, I have question on A4Q4(b). As far as I know, the elements of Jacobians are the partial derivatives of the functions. The secant method, however, does not have partial derivatives in its terms. Then, is there any particular ways to derive partial derivatives from the secant method which that can be the elements of the Jacobians?

Well, solving a system of equations with the secant method is not so different to solving a single equation. When solving a single equation, the derivative f' is replaced by a first-order approximation. Do the same here and use very small Δx and Δy for the first iteration. 1 point bonus.

Question by Jaehyuk

Professor, I have question on A#4Q3-(b). According to the definition of the order of convergence, we can derive p from $|\epsilon_{n+1}| = k\times|\epsilon_n|^p$*. Here starts my problem. That is, for* x_1*, the root is -0.0025, the 1st guess is 0, the 1st iteration yields 5, and the 2nd iteration yields 4.91244. Assigning these values into the formula above, this ends up as follows;*$|5-(-0.025)| = k\times|0-(-0.025)|^p$ *and* $|4.91244-(-0.025)| = k\times|5-(-0.025)|^p$*. This yields* $k = 4.96393$ *and* $p = -0.003315$ *which does not match with the answer. I am wondering which part of the process is wrong.*

You're not doing anything wrong. If you would answer this in the exam, you would get full points. But, in general, we do not know what the exact root is. Thus, it is necessary to approximate it as the solution at the next iteration. If using the solution at the next iteration (i.e. 4.573738E+00) as the root, you'll get the answer listed. I made this more clear within the question formulation. 2 points bonus.