Numerical Analysis Questions & Answers

Question by Student 201427128

professor, I have question in A7#3. In this case, N is even(=50). In simpson method, Interval I_i need 3 data point.
ex) I_1 mean interval between point (i_1, i_2, i_3)
so when I use simpson method in this problem, I_{49} (between i_{49}, i_{50}) is left. how can I solve it? Maybe I think the remaining Interval I_{49} can be solved by trapezoidal rule. Is it the right way?

That's for you to find out. Check if you obtain reasonable convergence rates using your approach when N is small (i.e. as you would expect for the Simpson rule) and if so, it means it's fine.

Question by Jaehyuk

Proffessor, I have a question about 4th order Runge Kutta method. I made a assumetion that $f(\phi, t) = f(t)$. In this case,

$$k_1 = \triangle t \times f(t), k_2 = k_3 = \triangle t \times f(t + \frac{\triangle t}{2}), k_4 = \triangle t \times f(t + \triangle t)$$

. Substitute them to 4th order Runge Kutta,

$$\phi_{n+1} = \phi_n + \triangle t \times (f(t) + 4 \times f(t + \frac{\triangle t}{2}) + f(t + \triangle t))/6$$

, which is same as the Simpson's Rule. Am I on the right track to relate 4th order Runge Kutta to Simpon's Rule?

Hm, didn't I mention this in class..? It's a good observation, but not a question.

Question by Student 201427128

professor, I have question about A7#5(=Quiz 7). In Quiz, I got the polynomial coefficients. In Numerical Analysis Scores page, you comment "using Taylor series" but I don't understand what is mean. I need help.

I'll check again your quiz to be sure. The problem in your case is that you used the Simpson rule to get I_i: you shouldn't do this here hence why you got $2/3$.

Question by Jaehyuk

Professor, I have a question about A8Q#4. According to the question, dt(= 0.2) and tmax(= 1.0) determine the steps to find q at t is 1.0. In this case, when step reaches 2, this indicates t = 1.0 and we can find q at t = 1.0. However, in case dt = 0.4 and tmax = 1.0, when step reaches 2 this indicates q at t = 0.8, and when step reaches 3 this indicates q at t = 1.2. Do I have to consider this as an error or is there another ways to reduce this error?

Good question. You should implement the algorithm so that dt is changed at the final step in order to yield t=tmax after the iterative process. 2 points bonus.

Question by Student 201527105

professor, i have a question about A7-Q#3. To apply the Simpson's rule, N should be odd. That is what i learn. But in this problem, N is even. Even though N is even, i tried to find best way to get the solution, using the Simpson's rule. So, to minimize the error in the application of the Simpson rule, i tried to add 1 or subtract 1 to N in order to make N odd. If the value of delta x in the last interval is very small, is this a good idea?

No, this is not what the question says. You can't change N: you need to keep it as even.

Question by Student 201527105

professor, I have a question about A8-Q3(a). I don't know whether goal of this problem is to get the actual integral value or to get the solution by using the forward Euler method by hand. And if i solve this problem by using the method of forward Euler method, how do i calculate part of error by hand?

You should use the forward Euler method for part (a) and (b). I'm not sure what you mean by "part of error". Why do you want to find the error?