

Numerical Analysis Questions & Answers

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?

Question by Student 201427128

professor, I want to check my solution about A8#3(a).

In Qestion, $\frac{dq}{dt} = -\frac{q}{RC} = f(q_n, t_n)$

Using foward euler method, $q_{n+1} = q_n + \Delta t f(q_n, t_n) + O(\Delta t^3)$

$$q_1 = q_0 + \Delta t f(q_0, t_0) = q_0 + \Delta t \left(-\frac{q_0}{RC}\right) = 2 + 0.2\left(-\frac{2}{3}\right) = \frac{28}{15}$$

(given, $q_0 = 2, RC = 3, \Delta t = 0.2$)

Is it right track? or I have to use ' $q = q_0 * \exp(-\frac{t}{RC})$ ' in calculate?

Yes, you're on the right track. You should not be using at all the exact solution.

Question by Jaehyuk

Professor, I have a question about Simpson Rule. When there are even data, we cannot use Simpson Rule, because it requires odd data points. In this case, how can we modify the Simpson Rule to integrate.

That was a question asked to you in one assignment problem. I can not give you the answer directly to an assignment question.

Question by Jaehyuk

Professor I have a question about simpson rule. If there are even data, by using $x_{n+\frac{1}{2}}$ we can modify the number of data points into odd number. Is this the right way to use Simpson Rule?

No, you should not change the number of points. The number of points is fixed. You need to find a way to adapt the Simpson rule (or to combine it with another rule) so that it will work on an even number of points.