

Numerical Analysis - Homework 21

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Homework Problems

- Do problem 2 (a-d) in chapter 8.5 using BOTH second order Taylor and Runge-Kutta. These are the same problems you solved using Euler. Compare the results and the error for each of the methods.
- Non-Book Problem:
Use Second Order Runge-Kutta Method to solve the following ODEs

$$y' = 2(t + 1), \quad y(0) = 1$$

$$y' = \frac{2y}{t + 1}, \quad y(0) = 1$$

on the range $[0, 1]$ with $h = 0.1$. Note, both ODE's have the same real solution: $y = (t + 1)^2$. Discuss the error in each case. You should find an interesting result; in one case Runge-Kutta should give an exact answer and in the other an approximate answer. This shows that Runge-Kutta is highly dependent on the form of the equation. Try to describe in words why one of the above equations is solved exactly and the other not?