Assignment 5

November 14, 2023

Lecturer: Saurav Samantaray

Q. 1 Derive a class called `FowardEulerSolver` from the abstract class `AbstractOdeSolver`, that allows the user to specify the function `RightHandSide`, and contains a method `SolveEquation` that uses the forward Euler method to calculate the values of y_i as described in the class notes, and writes the values of t_i and y_i to file.

Test the class `FowardEulerSolver` using the initial value ordinary differetial equation

$$\frac{dy}{dt} = 1 + t$$

for the time interval $0 < t < 1$, and with initial condition $y = 2$ at $t = 0$. This equation has solution $y = (t^2 + 2t + 4)/2$. Investigate how the choice of step size affects the accuracy of the solution (compute solutions with different h and plot and make a conclusion).

Q. 2 Repeat the above using the fourth order Runge–Kutta method to calculate the values of y_i.