Homework

January 29, 2008

Implement the 4th order Runge-Kutta method:

$$w_0 = \alpha$$

$$k_1 = hf(t_i, w_i),$$

$$k_2 = hf(t_i + \frac{h}{2}, w_i + \frac{1}{2}k_1),$$

$$k_3 = hf(t_i + \frac{h}{2}, w_i + \frac{1}{2}k_2),$$

$$k_4 = hf(t_{i+1}, w_i + k_3),$$

$$w_{i+1} = w_i + \frac{1}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

Solve the following initial value problem

$$y' = y - t^2 + 1 \qquad 0 \leq t \leq 4 \qquad y(0) = 0.5$$

upto $t = 4$. Demonstrate that your implementation is accurate to $O(h^4)$.