

IM343

HOMEWORK-8 (Due on 27.12.2019)

- 1) Given the initial conditions, at $t=0$, $y(0)=1$ and $dy/dt(0)=0$, solve the following initial-value problem from $t=0$ to 1 with a step size of $\Delta t=0.5$ s by second order Runge Kutta (Ralston Method). If the exact solution is $y=\cos 2t$, calculate the percent relative error in your numerical solutions, and comment on the accuracy of the method.

$$\frac{d^2y}{dt^2} + 4y = 0$$

- 2) Solve the following initial value problem over the interval from $t=0$ to 2 where $y(0)=1$. Display all your results on the same graph. Calculate the percent relative error table for all methods.

$$\frac{dy}{dt} = yt^2 - 1.1y$$

- (a) Analytically.
- (b) Euler's method with $h=0.5$
- (c) Heun's method with $h=0.5$.
- (d) Third-order RK method with $h=0.5$.