1. Consider the non-linear ordinary differential equation

$$y' + y(1 - y) = 0$$

with $y(0) = 1/2$.

- Write a code to solve the above to obtain $y(1)$ using
  (a) Euler Explicit
  (b) Euler Implicit
  (c) Trapezoidal Rule
  (d) RK2
  (e) RK4

For each of the above, identify for what time stepping the scheme is stable, and the overall global accuracy.

2. Write a code that guarantees global fourth order accuracy to solve

$$y'' + 4y' + 3y = sin(t^2)$$

with $y(0) = 0$ and $y(1) = 1$ using the shooting method.