

**Final Exam Review**

1. Consider  $y' = 1 - 2t + 3y$ ,  $y(0) = 0.5$ . Find approximate values of the solution at  $t = 0.1, 0.2, 0.3$ .
  - (a) Use Euler's method with  $h = 0.1$
  - (b) Use the improved Euler's method with  $h = 0.1$
  - (c) Use the Runge-Kutta method with  $h = 0.1$

2. (a) Solve  $h'' + 4h' + 3h = \delta(t)$ ,  $h(0) = 0$ ,  $h'(0) = 0$
- (b) Express the forced response of  $y'' + 4y' + 3y = f(t)$ ,  $y(0) = 0$ ,  $y'(0) = 0$ , using a convolution integral.
- (c) Use the result in (a) & (b) to solve  $y'' + 4y' + 3y = \frac{1}{1+e^t}$ ,  $y(0) = 0$ ,  $y'(0) = 0$
- Hint: For integral evaluation use substitution:  $u = 1 + e^\tau$