

## Math 4513, Homework 5, Due on 12/02/2011

1. (10 points) Consider the initial value problem

$$y' = -5y + 5t^2 + 2t, \quad y(0) = 1/3.$$

The exact solution is  $y(t) = t^2 + \frac{1}{3}e^{-5t}$ .

- (a) Given  $h = 0.1$  and  $w_0 = 1/3$ ,  $w_1 = 0.212176887$ ,  $w_2 = 0.16262648$ ,  $w_3 = 0.16437672$ . Use the 4th order Adams-Bashforth method to compute an approximation to  $y(0.5)$ . Compare your solution to the exact solution and find the error.
- (b) Given  $h = 0.1$  and  $w_0 = 1/3$ ,  $w_1 = 0.212176887$ ,  $w_2 = 0.16262648$ . Use the 4th order Adams-Moulton method to compute an approximation to  $y(0.5)$ . Compare your solution to the exact solution and find the error.
2. (10 points) Use Gaussian elimination with scaled partial pivoting to solve the following problem:

$$x_1 + x_2 - x_3 = 0$$

$$12x_2 - x_3 = 4$$

$$2x_1 + x_2 + x_3 = 5$$

Write down the augmented matrix at each iteration step.