

Math 128a, Homework 11

due November 27.

1. Exercise 7.9. Is the stability condition satisfied?
2. Exercise 7.11. Do only the Adams-Moulton part.
3. (due December 4)
 - (a) Using `help`, read the descriptions of Matlab functions `ode45`, `ode113`, `ode23s`, `odefile`, and `odeset`.
 - (b) Write a Matlab function to implement the Euler-modified Euler pair (that is, use the Euler method for solving the equation and the modified Euler method for estimating the error and choosing the step size). Also write a Matlab function to implement the extrapolation method, based on the midpoint or the modified midpoint method (your choice). Make sure that the step size is not allowed to vary by more than a factor of 5 up or down.
 - (c) Test the three functions from part (a) and two functions that you wrote on the follow equations. Take the initial step size to be 0.1.
 - $y' = 10y$, $y(0) = 1$, on $[0, 1]$.
 - $y' = -100y$, $y(0) = 1$, on $[0, 1]$.
 - $y' = 1 + (x - y)^2$, $y(2) = 1$, on $[2, 3]$.
 - $y' = y(4 - y) + 2 \sin^5(t)(2 - y)$, $y(0) = 2$, on $[0, 1]$.

For all of these, make a printout of the mesh points x_i , the time steps h_i , and the approximations y_i .

More details on the next week's assignment.