

Computer Lab #6: MATH 471
Monday, October 27, 2008.

1. Download and run the third-order Taylor series m-files for solving

$$\frac{dx}{dt} = -x + \cos(t) + t^2, x(0) = 1$$

on $[0, 4]$. Plot the numerical solution given by the method together with the true solution

$$x(t) = \frac{1}{2} \cos(t) + \frac{1}{2} \sin(t) + t^2 - 2t + 2 - \frac{3}{2}e^{-t}.$$

2. Modify the above code so that it implements the third, second, and first order Taylor series methods. Plot the numerical and analytic solutions together in each case. At what point do you start to see the numerical and analytic solutions depart?
3. **Problem from the Homework:** Modify `AOTwoD.m` so that it uses the QR factorization for solving $\mathbf{Ax} = \mathbf{b}$. Hand in a listing of your code. You may use MATLAB's `qr` function, and be sure that you use the properties of the Q and R matrices (orthogonal and upper triangular respectively).