AMSC/CMSC 661 - HW 6
Due Thursday March 28 (in class)

1. Use a fourth-order Runge-Kutta method in Matlab to solve (until $T = 4$)

$$(e^t + 1)x'(t) + x(t)e^t - x(t) = 0,$$

subject to $x(0) = 3$.

2. The formula

$$x_{n+1} = (1 - A)x_n + Ax_{n-1} + \frac{h}{12}\left[(5 - A)x'_{n+1} + 8(1 + A)x'_n + (5A - 1)x'_{n-1}\right]$$

is known to be exact for all polynomials of degree m or less for all A. Determine A so that it will be exact for all polynomials of degree $m + 1$. Find A and m.

3. Use (any) methods of order 2 and 4 on Matlab to solve (until $T = 1$)

$$\begin{cases} x'_1 = t + x_1^2 + x_2, \\ x'_2 = t^2 - x_1 + x_2^2 \end{cases}$$

Where $x_1(-1) = 0.43$, and $x_2(-1) = -0.69$.