Assignment #6, December 4th, 2017, IN CLASS
AMATH 740, CS 770, CM 750
Fall 2017

Reading:
C. Moler "Numerical Computing with Matlab" (online, free download), Ch. 7

1. Show that no choice of coefficients in the one parameter family of the explicit two stage Runge-Kutta methods derived in class will result in the local error of order 4.

2. Consider the following method

$$y_n = y_{n-1} + h(\theta f(y_n) + (1-\theta) f(y_{n-1})), \quad 0 \le \theta \le 1,$$

for solution of $y' = f(y)$.

   (a) Compute the local error d_n. For what value of θ, d_n is the smallest? Why does this happen?

   (b) Find the values of θ for which the absolute stability region contains the whole left half plane of the complex plane?

3. Exercise 7.5 in Moler. It is not necessary to strictly follow the format of ode23tx. Note that Octave does not have ode113, so you do not have to consider it.