EXERCISE 3

MAT260, SPRING 2017

Problem 1. Exercise 2.8 from the textbook.

Problem 2. Exercise 3.2 from the textbook.

Problem 3. Exercise 3.4 from the textbook.

Problem 4. Write a matlab function which compute one step for any ERK method. Input should be $A, \mathbf{c}$ and $\mathbf{b}$, which describe the method and h, t_n, y_n and $f(t, y)$ which describe the problem.

Then write a matlab script which reads input t_0, T, h and $y(t_0) = y_0$, do the timestepping `for n=1:N` ($N = (T - t_0)/h$ by calling your ERK-function and plot the output.

Test the program for

$$y' = \lambda y + \cos t - \lambda \sin t \qquad y(0) = 0 \tag{1}$$

Try $\lambda = 2, -5, -10$ and $0 \leq t \leq 5$. Compare with the analytic solution. What is the effect of λ on the numerical accuracy?