

# Homework Assignment 13

## Due on Friday 01/03

### Programming Problems:

1. Write a Matlab code that solves

$$y(a) = \alpha, \quad y'(t) = f(t, y) \quad \forall t \in [a, b]$$

by using classical RK4 method. Your code should take  $a, b, h, f, \alpha$  as inputs and return  $w_i$  as outputs, where  $h$  is the step size and  $w_i$  is an approximation for  $y_i$ . Your code should also work for system, i.e.,  $y(t)$  and  $\alpha$  can be vectors.

2. (**Bonus Problem. Add one point in final grade.**) Write a Matlab code that simulates three-body problem with any given masses, initial positions and velocities. Also give a set of data that generates an interesting orbit. Save your codes as M-file and submit it to ccchu@math.nthu.edu.tw

### Writing Problems:

Do the following exercise problems in the text book by Bradie,  
Sec 7.4: 3\*, 4(a), 5(b), 8(c)\*, 10(a), 12(d), 13(e), 14(b)\*, 18\*  
Sec 7.5: 2\*, 3\*, 4, 5(d), 9(d, f)\*  
Sec 7.8: 1(b), 2(a)\*, 7(a, c, f)\*, 8(a, b, c)\*, 11(a), 12(b), 17\*  
Just turn in problems with \*.