

# Computational MRI Worksheet 3

Gary Hui Zhang, PhD

## Reading

Ch.4

### Problem 4.1 (pg 56)

If you don't know how to solve the differential equation, go straight to the Matlab implementation.

Write a matlab function to predict the longitudinal magnetisation at time  $t$  from the initial value at time 0 with Eqn 4.12. Consider carefully the choice of the arguments for your function.

Use your function to replicate Fig. 4.1 (a) but includes a range of  $T_1$  values from Table 4.1.

### Problem 4.2 (pg 57)

Hint for (b): for time  $t$  much smaller than  $T_1$ , the exponential function can be approximated by the first few terms of its Taylor expansion, such that

$$\exp(-t/T_1) \approx 1 - t/T_1$$

### Problem 4.3 (pg 61)

Implement Eqns 4.25-4.27 in Matlab to verify the steady-state solution.

### Problem 4.5 (pg 63)