ASSIGNMENT 5 — Advanced Techniques I

For all questions below, provide all programming code and plots in the report. Unless stated otherwise, assume $\alpha = 0.05$

Maximum Likelihood

1. You have collected the following data on a group of individuals: [8.453532, 10.025041, 11.495339, 9.367600, 8.333229, 9.788753, 10.883344, 10.543059, 9.869095, 10.799819]. (10 marks).

   a. Work through the math of calculating the Normal distribution MLE estimate for practice. No need to show this work.

   b. What is the MLE assuming a Normal distribution. (2 mark)

   c. Use a brute force method to find the maximum likelihood estimates. (4 mark).

      . vary μ from 5 to 15 and σ from 0.5 to 1.5, both in increments of 0.1.

   d. Use an optimizer to find the maximum likelihood estimates. Start your initial guesses as $\mu = 8$ and $\sigma^2 = 0.5$ (4 mark).

      . hint: https://stackoverflow.com/questions/40620277/r-how-can-the-nlm-function-be-used-for-optimization-with-multiple-variables

Bayesian Statistics

2. XXXXX. 12 Marks.

   a. Plot the data. (1 mark)