

Assignment 2 (5 pts):

There is 1 bonus point, but the score is capped at 5 points.

Within each problem, the subproblems are worth equally.

1. Problem 4.2 from textbook, p. 232. (1 pt)
2. Problem 4.8 from textbook, p. 235. (1 pt)
3. Problem 5.2 from textbook, p. 236. (1 pt)
4. Problem 5.4 from textbook, p. 236. (1 bonus pt)

Hint:

$$\begin{aligned}\frac{\partial^2}{\partial \theta^2} \log p(y_1, \dots, y_N | \theta, \sigma^2) &= -\sum_{i=1}^N \frac{1}{\sigma^2} = -\frac{N}{\sigma^2} \\ \frac{\partial^2}{\partial \sigma^2 \partial \theta} \log p(y_1, \dots, y_N | \theta, \sigma^2) &= -\sum_{i=1}^N \frac{(y_i - \theta)}{(\sigma^2)^2} \\ \frac{\partial^2}{\partial (\sigma^2)^2} \log p(y_1, \dots, y_N | \theta, \sigma^2) &= \frac{N}{2(\sigma^2)^2} - \sum_{i=1}^N \frac{(y_i - \theta)^2}{(\sigma^2)^3}\end{aligned}$$

It may be helpful to use <https://www.wolframalpha.com/>
See <https://www.wolframalpha.com/examples/mathematics/calculus-and-analysis/derivatives/> for computing derivatives.

5. All the R code for this assignment (2 pts)