

Problem Set 6

Due: November 19 at Noon CT

Rules:

1. You can work in groups of up to three students. Each student has to submit her/his own write-up of the answers. You have to list the members of your study group on the submission.
2. You may use generative AI to solve the problem set, but if you do, you need to describe how you used it and state the queries/prompts that you used to help with the problem set.

Question 1. What are the key differences between Bayesian and frequentist inference? What are the coverage probability statements associated with frequentist confidence sets and Bayesian credible sets.

Question 2. Provide a one-page to two-page summary of the meta study paper by Meager (2019).

Question 3. Simplify the formulas for the hierarchical model provided in the lecture notes for the homoskedastic case that $\sigma_i^2 = \omega_i^2 = \sigma^2$.

Question 4. Write a set of programs (in the language of your choice, e.g., R, Julia, Matlab, Python) that replicates the Monte Carlo simulation results reported in the lecture notes for $\lambda = 1$, $\sigma^2 = 1$, and known $\nu = 1$ (oracle case), $N = 500$, $J = 2$, $N_{sim} = 500$, $\pi_k = 0$, $\varphi = 0$. The nominal coverage should be 80%.