

Question 2

Task 1: Mathematical Derivation

Refer to the lecture 3 notes MLE part and modify the derivation to handle weighted data. Re-derive the MLE estimators.

Task 2: Python Simulation and Fitting

1. Generate one-dimensional data sampled from a normal distribution.
2. Fit the data using:
 - The standard (unweighted) MLE.
 - A weighted MLE where observations with values below the mean are assigned higher weights.
3. Plot the results from both fittings for visual comparison.

Submit your derivation, Python code, and the resulting plots.