Module 17 self-assessment

Question 1

Consider $X_1, X_2, \ldots, X_n$ iid random variables from a population with mean μ_X and variance σ_X^2. If we compute an estimator for the variance as

$$S_n^2 = \frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X}_n)^2,$$

where $\bar{X}_n = \frac{1}{n}(X_1 + \ldots + X_n)$, what is the bias of this estimator?

Question 2

Form and evaluate the likelihood function for the observations

$$x_1 = 2, \quad x_2 = 1, \quad x_3 = 3, \quad \text{and} \quad x_4 = 2,$$

if they are drawn from a Binomial distribution with $n = 3$ and some unknown probability of success p. Assume that the observations are iid random variables. Subsequently, compute the MLE estimator for p.