

Pre-class preparation

Please read the following textbook sections from Degroot and Schervish's *Probability and Statistics* (fourth edition) or watch the video, as indicated:

- Video: <https://expl.ai/XDJHJFJ>; and
- Textbook: Section 8.7 (skip Example 8.7.6 on page 510)

Objectives

By the end of the day's class, students should be able to do the following:

- Provide the definition of the Mean Squared Error of an estimator for an unknown parameter θ .
- State the definition of the bias of an estimator $\delta(\mathbf{X})$ for a function of the parameter θ , $g(\theta)$.
- Determine whether a given estimator is unbiased.
- Explain how the mean squared error of an estimator for θ relates to its bias.
- Provide some limitations of unbiased estimators.

Reflection Questions

Please submit your answers to the following questions to the corresponding Canvas assignment by 8:45AM:

1. True or false? The bias of an estimator $\delta(\mathbf{X})$ for a parameter θ will be a function of the data \mathbf{X} .
2. Suppose $\delta_1(\mathbf{X})$ and $\delta_2(\mathbf{X})$ are two unbiased estimators for θ . Define a new estimator $\delta_3(\mathbf{X})$ that is some function of $\delta_1(\mathbf{X})$ and $\delta_2(\mathbf{X})$ and is also unbiased for θ .
3. Briefly explain one reason you might choose to use a biased estimator, instead of an unbiased one, in order to estimate a parameter θ .
4. (Optional) Is there anything from the pre-class preparation that you have questions about? What topics would you like some more clarification on?