

Pre-class preparation

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

- Start with this Video: Likelihood function
- Then read Textbook: Section 7.5 through end of Example 7.5.5. *Note that when statisticians use $\log()$, we almost always mean natural log.*

Objectives

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

- State the definition of a likelihood function and of the maximum likelihood estimator for a parameter.
- Implement the method of maximum likelihood using calculus and by inspection of the likelihood in order to produce a reasonable estimator for a given parameter.
- Discuss drawbacks of the maximum likelihood estimator, and provide examples where these drawbacks occur.

Reflection Questions

Please submit your answers to the following questions to the corresponding Canvas assignment by 9:00AM:

1. True or false? The maximum likelihood estimator for θ is obtained by finding the value of x that makes $f(x|\theta)$ as large as possible, that is, by solving $\frac{d}{dx}f(x|\theta) = 0$.
2. When finding the the maximum likelihood estimator, why is it “legal” or mathematically equivalent to maximizing the log of the likelihood function?
3. Consider the following two statements below. Identify which statement is the correct interpretation of the MLE and which is the incorrect interpretation. For the incorrect interpretation, specify why the statement is incorrect.
 - (a) The MLE is the most probable value of θ , given the data \mathbf{x} .
 - (b) The MLE is the value of θ that maximizes the probability/likelihood of observing the data \mathbf{x} .
4. (Optional) Is there anything from the pre-class preparation that you have questions about? What topics would you like would you like some more clarification on?