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:

- Textbook: 7.4

Objectives

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

- Explain in words what a loss function represents and why a loss function is required, and provide examples of a few loss functions.
- State the definition of a Bayes estimator, discuss its properties, and explain its dependence on the choice of loss function and prior distribution.
- Understand and reproduce the proof for obtaining the Bayes estimator under squared loss and absolute loss.
- Compute (or approximate) the Bayes estimator under the squared loss and absolute loss functions.

Reflection Questions

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

1. Consider the following loss function for using a to estimate θ:

$$L(\theta, a) = \begin{cases} (\theta - a)^2 & a < \theta \\ 10(\theta - a)^2 & a \geq \theta \end{cases}$$

   Does this loss function penalize overestimation or underestimation more? Why?

2. True or false? Under the Bayesian framework, the expected loss $\mathbb{E}[L(\theta, a)]$ is a function of the estimator a but not the parameter θ.

3. Provide an example/reason why we might prefer squared loss over absolute loss when obtaining a Bayes estimator.

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?