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: 8.3 (stop before Proof of Theorem 8.3.1 on page 476. You are welcome to skim this proof if you are interested in a detailed linear algebra proof, but I'll present a different proof in class.)

Objectives

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

- Identify the joint distribution for the sample mean and sample variance for samples from a Normal distribution.

- Estimate the sample size needed to ensure that both the sample mean and sample standard deviation are within a certain distance of their respective parameters.

Reflection Questions

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

1. Suppose $X_1, \ldots, X_n$ are an iid random sample from $N(\mu, \sigma^2)$ where both mean and variance are unknown. Let $\hat{\sigma}^2$ be the sample variance:

$$\hat{\sigma}^2 = \frac{1}{n} \sum_{i=1}^{n} (X_i - \bar{X})^2$$

   Does the distribution of $\hat{\sigma}^2$ depend on σ^2? Does it depend on μ?

2. (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?