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: 8.5 (just pages 489 - 493)

Objectives

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

- Define a pivotal quantity and explain how it can be used to construct a confidence interval for a parameter.
- Construct theoretical confidence intervals for a variety of parameters beyond just the sample mean.
- Describe several shortcomings of confidence intervals.

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 a random sample from $N(\mu, \sigma^2)$ where both the mean and variance are unknown. What is a pivotal quantity for the population/true mean μ?
   Hint: Think back to the formula for constructing confidence intervals in Theorem 8.5.1 from the previous reading.

2. Suppose we observe $n = 16$ data points from the Normal distribution above. From the sample, we calculate sample mean $\bar{x} = 10$ and sample variance $s^2 = 25$. We use these to calculate a 95% confidence interval for μ: (7.33, 12.66). Explain why it would be incorrect to say that "this particular interval (7.33, 12.66) has a 95% probability of containing the population mean μ".
   Note: This has nothing to do with mistakes in the confidence interval formula, and everything to do with how we interpret the results of a confidence interval.

3. (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?