

1.
 - a. If we take many, many samples and calculate a confidence interval for each, about 95% of these intervals will capture the true mean amount of water in all bottles produced by this bottling company.
 - b. When the population standard deviation is unknown, we use the sample standard deviation to estimate the population standard deviation. To account for this extra variability, we use a t -distribution instead of a standard normal distribution to calculate confidence intervals.
2. Interval 2 will be wider because the t -distribution has more variability than the standard normal distribution causing the t^* value to be greater than the z^* value. Since t^* is greater than z^* at the same level of confidence, the margin of error of Interval 2 will be greater than the margin of error for Interval 1, making Interval 2 wider than Interval 1.
3.
 - a. $\frac{2.1}{\sqrt{10}} = 0.664$
 - b. 1.833 is a t^* critical value because the sample standard deviation is being used to estimate the unknown population standard deviation.
 - c. $1.833(0.664) = 1.217$
 - d. $9.4 \pm 1.217 = (8.183, 10.617)$
We are 90% confident the interval from 8.183 hours to 10.617 hours captures the true mean battery life for all rechargeable batteries of this type.
4.
 - a. Interval B was constructed with a higher level of confidence because it is wider than Interval A. Wider intervals are needed in order to have higher confidence that the interval will capture the true mean.
 - b. The sample mean wait time is 5 minutes.
5. A
6. B