Introduction to Statistics
Activity 8.2b **SOLUTIONS**

Confidence Intervals for Means

You take a SRS of students and ask them how many hours of sleep they got last night. You find a sample mean of 6.6 hrs and sample SD of 0.825 hrs. Below, you will calculate a 95% confidence interval for the average hours slept by students.

a) If you assume your sample size is 10, calculate the estimated standard error for your sample distribution.

$$\overline{se} = \frac{s}{\sqrt{n}} = \frac{0.825}{\sqrt{10}} \approx 0.2609.$$

b) Find your critical value (t^*_{df}). You'll need to use the t-distr calculator (there is a link on the class GDoc).
df = 9, so for 95% confidence, we have $t^*_9 = 2.262$

c) Calculate your confidence interval.

$$\bar{x} \pm t^*_9(\overline{se}) = 6.6 \pm 2.262(0.2609)$$

So, CI is $(6.010,\ 7.190)$.

d) Describe your confidence interval in context.
We are 95% confident that the average number of hours slept by students is between 6 and 7.2 hrs.

e) What do you mean by "95% confident"?
We mean that if you were to repeatedly sample this population, and create confidence intervals with each sample mean, 95 percent of those confidence intervals would include the population parameter μ.

f) Now repeat parts a-d, but this time assume the sample size is 30.

$$\overline{se} = \frac{s}{\sqrt{n}} = \frac{0.825}{\sqrt{30}} \approx 0.1506.$$

$$\bar{x} \pm t^*_{29}(\overline{se}) = 6.6 \pm 2.045(0.1506) \quad \text{So, CI is } (6.292,\ 6.908).$$

We are 95% confident that the average number of hours slept by students is between 6.3 and 6.9 hrs.

g) How did the confidence interval change when the sample size increased?
A larger sample size led to a smaller 95% CI !! Two reasons: se is smaller, and so is t^*_{df} since we need to compensate less, w/a higher sample size.