TRUE OR FALSE? If the statement is *false*, how could you correct it to make it true?

1. A confidence interval refers to the probability that your point estimate is correct.
2. A confidence interval is a range of values around a statistic that are believed to contain, with a certain amount of certainty (e.g. 95% probability), the true value of that statistic (i.e., the actual value in the population).
3. For the same sample data, a 90% confidence interval for that sample will be larger than a 95% confidence interval for that sample.
4. When we’re calculating a confidence interval around the mean, the “point estimate” refers to the mean in the population.
5. Given a sample, a 95% confidence interval for that sample will be smaller than a 99% confidence interval for that sample because the margin of error will be smaller for a 95% confidence interval.
6. The margin of error is equal to the critical value x the standard deviation from your sample.
7. As the standard error in your sample gets smaller, our interval also gets smaller.
8. The upper bound for your CI = the point estimate *plus* the margin of error.
9. As your standard error decreases, your confidence interval length decreases (gets shorter).
10. Confidence intervals are ranges of values that are centered around a sample statistic.

Calculate the following

1. If our sample has x̄ = 16, se = 3, and N = 400, what are the lower & upper bound of the 95% CI?
2. If our sample has x̄ = 16, se = 3, and N = 400, what are the lower & upper bound of the 99% CI?
3. If our sample has x̄ = 16, se = 1, and N = 400, what are the lower & upper bound of the 99% CI?
4. If our sample has x̄ = 16, **s = 4**, and N = 400, what are the lower & upper bound of the 95% CI?

**KEY**

1. False. A confidence interval is a set of boundaries that should capture the population mean for a certain percentage of samples. With a confidence interval, we are not expressing confidence in the point estimate (i.e., the sample mean) itself, but rather we’re creating intervals around sample means. We set the intervals such that those intervals will capture the population mean a certain percentage (e.g., 95%) of the time.
2. True.
3. False. A 90% confidence interval will be **smaller (shorter length)** than a 95% confidence interval. As the confidence level gets smaller (95% to 90%), the critical value gets smaller, which is going to make the margin of error smaller and thus the total interval size smaller as well. Another way to think about it is that if we’re expressing *more* confidence (95% vs. only 90%), we need to set our interval *bigger* so that we can be more confident/certain that the interval actually captures the mean.
4. False. When we’re talking about confidence intervals, the point estimate refers to the mean in the *sample*. We use sample means to *estimate* population means, so the sample provides our point estimate. (We don’t know the population mean, so we cannot use that mean as our point estimate.)
5. True.
6. False. The margin of error is equal to the critical value x the *standard error* calculated from your sample.
7. True.
8. True.
9. True. This is true because if your standard error decreases, your margin of error decreases, leading to a shorter interval surrounding the mean.
10. True. In this case, we’ve been discussing CIs around the mean of our sample. The mean is an example of a sample statistic.
11. Lower = 10.12, Upper = 21.88 ; Margin of error = 3 x 1.96 = 5.88. Subtract this from 16 to get lower boundary and add this to 16 to get upper boundary.
12. Lower = 8.26, Upper = 23.74 ; Margin of error = 3 x 2.58 = 7.74. Subtract this from 16 to get lower boundary and add this to 16 to get upper boundary.
13. Lower = 13.42, Upper = 18.58 ; Margin of error = 1 x 2.58 = 2.58. Subtract this from 16 to get lower boundary and add this to 16 to get upper boundary.
14. Lower = 15.61, Upper = 16.39 ; First we have to calculate the standard *error*, which is equal to the standard deviation (given as 4) divided by the square root of the sample size (square root of 400 = 20). 4/20 = .20. Margin of error = SE x critical value, in this case. 0.20 x 1.96 = .392 Subtract this from 16 to get lower boundary and add this to 16 to get upper boundary.