MA 207, §8.3 Confidence Intervals for μ with Unknown σ

MA 207 Confidence Intervals Using t-Scores Name: _____

The General Social Survey asks respondents to rate their political views on a seven-point scale, where 1 is extremely liberal, 4 is moderate, and 7 is extremely conservative. Data from the 2012 GSS of 1874 people have a mean of 4.06 and a standard deviation of 1.45. We want to know the average political view of the overall population of Americans. This population mean is not known, so we need to estimate. The pop. standard deviation is also not known. Round answers to 3 decimals.

a. What two assumptions must be met before using a T-distribution? We need an approximately normal population or at least 30 in our sample.

b. How many degrees of freedom are there? $df = n - 1 = 1874 - 1 = 1873$.

c. Use the T-distribution calculator on StatCrunch to find the t-score for a 90% confidence interval for the population mean.

   $t^* = 1.646$.

d. Find a 90% confidence interval for the population mean.

   $(4.005, 4.115)$

e. If the sample size had been 400 instead of 1874 (but everything else was the same), would the 90% confidence interval be larger or smaller? Explain why. Then compute the confidence interval. The interval would larger because a smaller sample size means a larger margin of error. The interval would be $(3.94, 4.18)$, which is larger than the first one.

f. Using the original sample size of 1874, do you think a 99% confidence interval would be larger or smaller than the 90% confidence interval in part d? Explain why. Larger – with the same sample size, if we want to be more confident that the interval captures the true mean, we need a larger interval.

g. Use the T-distribution calculator on StatCrunch to find the t-value for a 99% confidence interval. Then compute the confidence interval. Compare the confidence interval found with part d. Did it match your expectations stated in f?

$t^* = 2.58$, the interval is $(3.97, 4.15)$, which is indeed larger than the original.