Stat 101
Summer 2023 Session 1
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Activity 7-1

Show all your work

Name: _____
Number: _____
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Score: ___/9

State all spreadsheet functions used.

Problem 1: The Marist Poll published a report stating that 66% of adults nationally think licensed drivers should be required to retake their road test once they reach 65 years of age. It was also reported that interviews were conducted on 1018 American adults, and that the margin of error was 3% using a 95% confidence level.

a. Is the margin of error reported by The Marist Poll correct?

b. Based on a 95% confidence interval, does the poll provide convincing evidence that *more than* 70% of the population think that licensed drivers should be required to retake their road test once they turn 65?

$p = 0.66$ from Marist poll. Margin of error is $1.96 \times \sqrt{0.66(1-0.66)/1018} \approx 0.029000415$, close to 3%, so yes.
Using the margin of error, the 95% confidence interval is $(63, 69)$ percent of adults, so 70% falls outside the confidence interval. The poll does not provide convincing evidence that 70% of the population think that licensed drivers should be required to retake their road test once they turn 65.

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Problem 2: An independent random sample is selected from an approximately normal population with an unknown standard deviation. Find the p-value for a sample size of $n = 16$ and test statistic, $T = 2.01$. Also determine if the null hypothesis would be rejected at $\alpha = 0.02$.

Since $n = 16$, the degree of freedom is $df = 16 - 1 = 15$.
Use spreadsheet function $(2 \times (1 - \text{T. DIST}(2.01, 15, 1))$, or simpler,
$\text{T. DIST. 2T}(2.01, 15) \approx 0.062771$.
If $\alpha = 0.02$, then each tail would have 0.01 in area, so use $\text{T. INV}(0.99, 15)$ to get the critical value $t^* \approx 2.60248$. The T statistic at $T = 2.01$ is not in the rejection region because $2.01 < 2.60$, so the null hypothesis should not be rejected.

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Problem 3: A 90% confidence interval for a population mean is $(65, 77)$. The population distribution is approximately normal and the population standard deviation is unknown. This confidence interval is based on a simple random sample of 25 observations. Calculate the sample mean, the margin of error, and the sample standard deviation.

The sample mean is $\overline{x} = (77 + 65)/2 = 71$.
Margin of error is $77 - 71 = 6 = t^*_{24} * \text{SE}$.
The standard error is $6/t^*_{24}$ for upper tail area of 5%. So $t^*_{24} = \text{T. INV}(.95, 24) \approx 1.710882$.
Instead of $\text{T. INV}(.95, 24)$, one can also use $\text{T. INV. 2T}(.1, 24)$ because the level of significance $\alpha = 1 - 0.9 = 0.1$, which is the area of the two tails.
So sample standard deviation is $s = \sqrt{n} \times \text{SE} \approx \sqrt{25} * 6/1.710882 \approx 17.53481$.

Score: /3

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