Confidence Intervals for Means Worksheet using http://istats.shinyapps.io/Inference_mean/

Example. A sample of 24 public high school students found that the students studied an average of 6.5 hours per week with a standard deviation of 2.3 hours. Assume that the distribution of hours spent studying is near normal.

1. Find a 99% confidence interval for the mean number of hours spent studying by public high school students

2. Give your interpretation of the interval.

3. Find a 90% confidence interval for the mean number of hours spent studying by public high school students.

4. Compare your results in part 1 with your results in part 3, and complete the sentences:

When created from the same sample data, a 90% confidence interval is _____ (wider or narrower?) than a 99% confidence interval.

When created from the same sample data, the margin of error for a 90% confidence interval is _____ (bigger or smaller?) than the margin of error for a 99% confidence interval.

5. With everything else remaining unchanged, how **large of a sample size** would be needed to estimate the population mean within ± 1 hour with 99% confidence? (Use trial-and-error in the given web app.)

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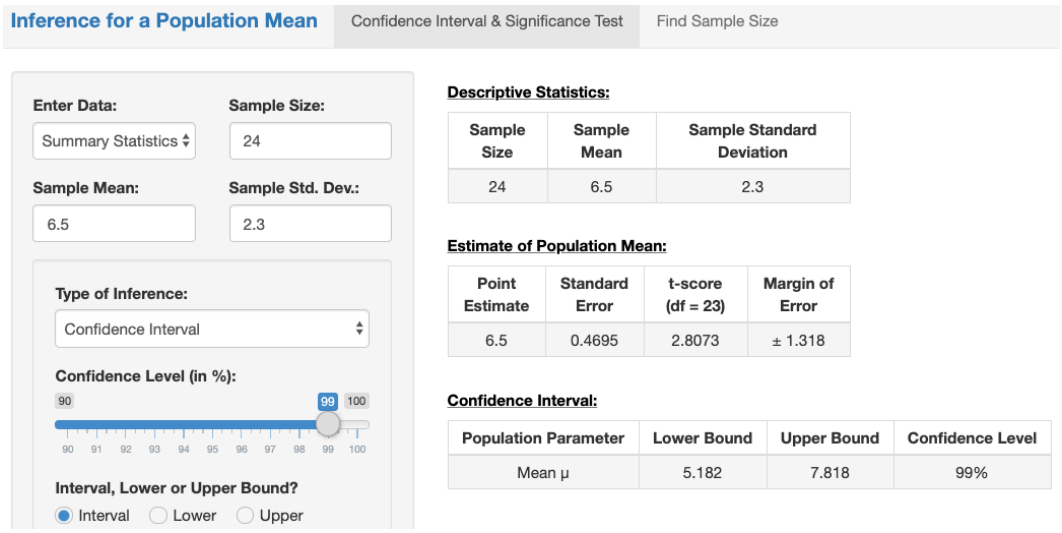
Example. A sample of 24 public high school students found that the students studied an average of 6.5 hours per week with a standard deviation of 2.3 hours. Assume that the distribution of hours spent studying is near normal.

1. Find a 99% confidence interval for the mean number of hours spent studying by public high school students.



Descriptive Statistics:

Sample Size	Sample Mean	Sample Standard Deviation
24	6.5	2.3

Estimate of Population Mean:

Point Estimate	Standard Error	t-score (df = 23)	Margin of Error
6.5	0.4695	2.8073	± 1.318

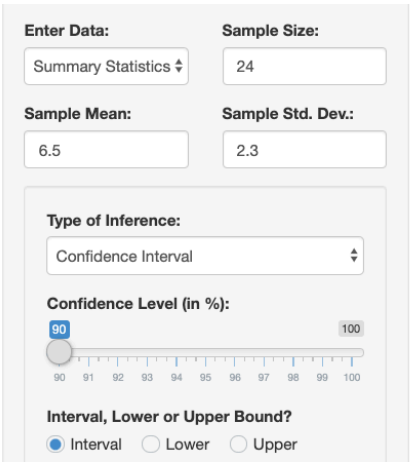
Confidence Interval:

Population Parameter	Lower Bound	Upper Bound	Confidence Level
Mean μ	5.182	7.818	99%

2. Give your interpretation of the interval.

From this data, we are 99% confidence that the mean number of hours spent studying by all public high school students is between 5.18 and 7.82 hours.

3. Find a 90% confidence interval for the mean number of hours spent studying by public high school students.



Descriptive Statistics:

Sample Size	Sample Mean	Sample Standard Deviation
24	6.5	2.3

Estimate of Population Mean:

Point Estimate	Standard Error	t-score (df = 23)	Margin of Error
6.5	0.4695	1.7139	± 0.8046

Confidence Interval:

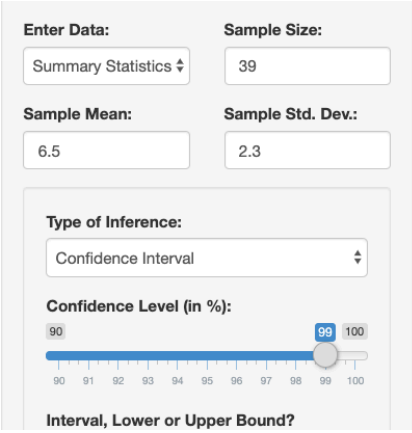
Population Parameter	Lower Bound	Upper Bound	Confidence Level
Mean μ	5.695	7.305	90%

4. Compare your results in part 1 with your results in part 3, and complete the sentences:

When created from the same sample data, a 90% confidence interval is narrower than a 99% confidence interval.

When created from the same sample data, the margin of error for a 90% confidence interval is smaller than the margin of error for a 99% confidence interval.

5. With everything else remaining unchanged, how **large of a sample size** would be needed to estimate the population mean within ± 1 hour with 99% confidence? **Using trial and error, it looks like $n = 38$ or $n = 39$ gives the desired margin of error.**



Descriptive Statistics:

Sample Size	Sample Mean	Sample Standard Deviation
39	6.5	2.3

Estimate of Population Mean:

Point Estimate	Standard Error	t-score (df = 38)	Margin of Error
6.5	0.3683	2.7116	± 0.9987

Confidence Interval:

Population Parameter	Lower Bound	Upper Bound	Confidence Level
Mean μ	5.501	7.499	99%