Standard Deviation and Standard Error Procedural Practice

Procedure Part 1 <u>Repeat this for each data set</u>

1. Calculate the sample size. Record this value at the bottom of the Name column.
2. Calculate the mean height. Record this value at the bottom of the Height column.
3. Calculate each measurement's deviation from the mean. Record these values in the Deviation column.
4. Square each deviation, making negative values positive. Record these values in the Squared Deviation column.
5. Sum the squared deviations. Record this value at the bottom of the Squared Deviation column.
6. Divide that sum of squared deviations by <u>one less</u> than the sample size (n-1). Record this value after the standard deviation formula underneath the table. **This is the standard deviation.**
7. Divide the standard deviation by the square root of the sample size. Record this value after the standard error formula underneath the table. **This is the standard error (of the means).**
8. Multiply the standard error by <u>two</u>. Record this value along with the mean underneath the table. It should be written as [your mean here] ± [2*SEM here]. **This is mean ± 2 SEM.**

Sample Data Set 1 – Human Height

Name	**Height** (nearest 0.5 cm)	**Deviation** $(x_i - \bar{x})$	**Squared Deviation** $(x_i - \bar{x})^2$
Eric	150.5		
Stan	170.0		
Kyle	160.0		
n =	$\bar{x}$ =		$\Sigma (x_i - \bar{x})^2$ =

$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}} =$ ________

$SE_{\bar{x}} = \frac{s}{\sqrt{n}} =$ ____________________

Mean ± 2 SEM = ______ ± ______

Sample Data Set 2 – Human Height

Name	**Height** (nearest 0.5 cm)	**Deviation** $(x_i - \bar{x})$	**Squared Deviation** $(x_i - \bar{x})^2$
Kenny	161.0		
Timmy	170.5		
Randy	175.5		
n =	$\bar{x}$ =		$\Sigma (x_i - \bar{x})^2$ =

$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}} =$ ______________

Mean ± 2 SEM = ______ ± ______

$SE_{\bar{x}} = \frac{s}{\sqrt{n}} =$ ____________________

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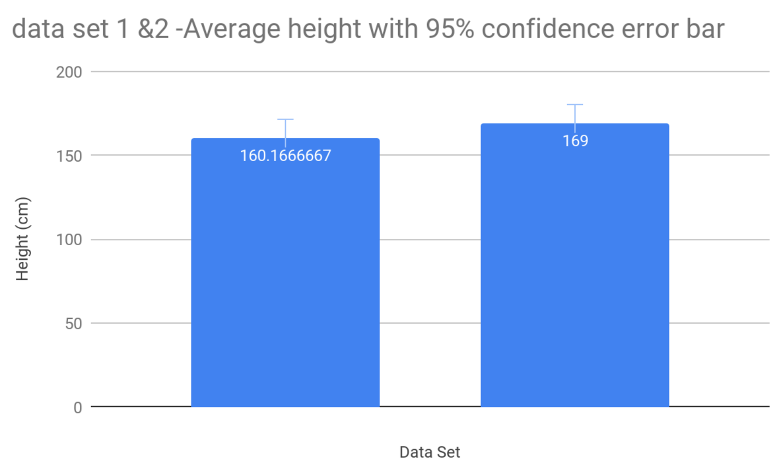
<u>READ THIS</u>

If the data is a normally distributed bell curve, 95% of the data should be between 2 SEM (standard errors of the mean). This "window of data" is known as a 95% confidence interval. Frequently, these values are plotted on graphs to help illustrate the range of data in a sample. Proceed to Procedure Part 2 for more information on how the graph will look.

Procedure Part 2

9. I have used Google Sheets to create a bar graph of the averages of the two data sets from the front page. I have linked them below. I would like you to create a 95% confidence error bar on the graphs. I have set the error bars to 30 just so you can see them, you need to figure out how to change it, and change it to the correct number. Then update the graph.



10. Finally, analyze your graph. Are the populations different? How do you know? *Hint: Look at the error bars.*