

Excel: Measures of Center and Spread

Sometimes you may just want to have Excel do a few calculations for you. Below is a list of useful Excel commands. These commands can be found in the **Formulas** menu, but it's often easier just to type the formula yourself than to search for it.

Mean	=AVERAGE(data range)
Standard deviation	=STDEV(data range)
Minimum	=MIN(data range)
Quartile 1	=QUARTILE(data range, 1)
Median	=MEDIAN(data range)
Quartile 3	=QUARTILE(data range, 3)
Maximum	=MAX(data range)

Any time you see **data range**, enter something like A2:A87 (or wherever your data is listed).

1. Download the "Spring 2019 class survey results.xlsx" document. As a reminder, it can be found on Canvas, in Files, then Excel Documents. Copy the "Typical American family income" data (column G) to column A in a new Excel workbook. Now select the entire column and click on the **Sort A to Z** button, which can be found in the **Data** menu. It looks like this: . The smallest value (min) should now be at the top and the largest value (max) should be at the bottom.
2. Somewhere on your spreadsheet, find the mean, standard deviation, and five-number summary of this data, using the commands above. Also calculate the IQR ($Q_3 - Q_1$); there is no Excel command for this. Label each value (ie, type the word MEAN next to your value of the mean, etc).
3. Look at your values of the mean and the median. Then look at the data. Somewhere within the area that you will print out, explain why the mean and the median are different from each other. Adding text to a spreadsheet is best done with a "text box," which can be found near the far right of the **Insert** menu. Click on **Text** and then **Text Box**. Find a space in your worksheet where you want your text to appear, and then click and drag over that space to create a rectangle. Once you have created a text box, you can move it by clicking and dragging on the border, and it can be resized to fit your text by clicking and dragging on any of the circles around the border. In your text box, explain why the values of the mean and the median are different. Specifically, which measure of center is larger, and why?
4. In your text box, explain which measure of center – the mean or the median – is more appropriate for describing the "center" of this distribution. (Remember that it depends on the shape of the distribution and whether or not there are any outliers.)
5. By now you should have noticed an unusually high outlier. Without deleting your previous calculations, recalculate the mean, standard deviation, five-number summary, and IQR **without** the most extreme high outlier. Do not delete any numbers from the list; just adjust the data range in your formulas.
6. Explain in your text box how removing the largest outlier affected the measurements. Specifically, which changed more: The mean or the median? The standard deviation or the IQR? Now compare the mean with the median in the new set of calculations. If someone were to ask you what was the typical student's guess of an American family's income, what would you say?
7. Print out one page with all your calculations and the text box. You do not need to include the original survey data, but do not delete it from the page; that will make all your calculations disappear. Instead, you can highlight (click on and drag over) what you want to print and then either 1) set the **Print Area** in the **Page Layout** menu, or 2) in the **Print** window (in the **File** menu) choose **Print Selection** under **Settings**. Before you hit **Print**, make sure that everything fits on one printed page; switch from "portrait" to "landscape" if you need to. Also, make sure that all your text can be seen in the text box. It is better to make your text box a little bigger than you think it needs to be. You should just have one printed page to submit.