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# How to calculate mean and standard deviation of grouped data in excel

m and s for Grouped Data Calculating the Mean from a Frequency Distribution Since calculating the mean and standard deviation is tedious, we can save some of this work when we have a frequency distribution. Suppose we were interested in how many siblings are in statistics students' families. We come up with a frequency distribution table below. Number of Children 1 2 3 4 5 6 7 Frequency 5 12 8 3 0 0 1 Notice that since there are 29 respondents, calculating the mean would be very tedious. Instead, we see that there are five ones, 12 twos, 8 threes, 3 fours, and 1 seven. Hence the total count of siblings is  $1(5) + 2(12) + 3(8) + 4(3) + 7(1) = 72$  Now divide by the number of respondents to get the mean.  $m = \frac{72}{29} = 2.5$

29 Extending the Frequency Distribution Table Just as with the mean formula, there is an easier way to compute the standard deviation given a frequency distribution table. We extend the table as follows: Number of Children (x) Frequency (f)  $f \cdot x$   $f \cdot x^2$  1 5 5 2 12 24 3 8 24 4 3 12 5 0 0 6 0 0 7 1 7 49 Totals  $\Sigma f = 29$   $\Sigma fx = 72$   $\Sigma fx^2 = 222$  Next we calculate  $s^2 = \frac{\Sigma fx^2 - \frac{(\Sigma fx)^2}{n}}{n-1} = \frac{222 - \frac{72^2}{29}}{28} = 43.24$  Now finally apply the formula to get  $s = \sqrt{43.24} = 6.576$  Click here for an applet that finds statistics from grouped data. Weighted Averages Sometimes instead of the simple mean, we want to weight certain outcomes higher than others. For example, for your statistics class, the following percentages are given Homework = 150 Midterm = 450 Project = 100 Final = 300 Suppose that you received an 88% on your homework, a 97% on your midterms, a 98% on your project and an 78% on your final. What is your average for you class? To compute the weighted average, we use the formula  $\text{Weighted Average} = \frac{\text{Sw}}{\text{Sw}}$  Sw We have  $\text{Sw} = 88(150) + .97(450) + .98(100) + .78(300) = 900.5$  and  $\text{Sw} = 150 + 450 + 100 + 300 = 1000$  Now divide to get your weighted average  $\frac{900.5}{1000} = .9005$  1000 You squeaked by with an "A". Back to the Descriptive Statistics Home Page Back to the Elementary Statistics (Math 201) Home Page Back to the Math Department Home Page e-mail Questions and Suggestions How to compute grouped mean and SD in Excel: To compute mean and standard deviation for a regular list of data (not grouped data): If the data are in a single column, say column A, starting from row 1 and having 100 numbers, then you type (in some cell where you wish to store the mean) =AVERAGE(A1:A100) and for the SD, =STDEV(A1:A100) The data don't have to be in a single column or row, however. If they are in five columns of 10 numbers in each column, then you can type =AVERAGE(A1:E10) and =STDEV(A1:E10) For grouped data it's a bit more complex. Click here for the spreadsheet that we used in class to demonstrate grouped data. The rest of this page explains this spreadsheet. There's a few things to point out here: Column A contains the x-values (x<sub>i</sub>) Column B contains the frequencies (f<sub>i</sub>) In Column C, we form the products f<sub>i</sub>\*x<sub>i</sub>. Starting with row two, type in cell C2 the formula =A2\*B2 Now you can copy this cell and paste it in the rest of column C; Excel automatically changes the number 2 to the correct row number each time. We now have the products f<sub>i</sub>\*x<sub>i</sub>, and can calculate their sum in cell C11: =SUM(C2:C9) Or, if we had already entered the sum formula for column B, you can copy and paste the formula in cell B11 to cell C11. Again, Excel automatically changes "B" to "C" when you do this. We can now calculate the average by typing, in cell G3: =C11/B11 Next, to get the SD, we need to compute the squared deviations from average and multiply each by the frequency. This is Column D. In cell D2, type =B2\*(A2-\$G\$3)^2 And then copy this cell and paste down the rest of the column. To get the total in cell D11, copy and paste from either B11 or C11. Notice the \$ signs in the last formula. This tells Excel that when copying and pasting, it should not change the "G" and the "3" with each new row number, but keep them fixed. Finally, we get the SD in cell G6 by typing =SQRT(D11/B11) Excel is known for making data storage and organization more manageable, going far beyond the simple organization of rows and columns. But some users may overlook Excel's ability to make tedious work much more efficient. Formulas in Excel can save you a lot of time and manual work. It's all about knowing what to use — and when. If you find yourself spending a lot of time in your Excel spreadsheets, there's a good chance a formula could speed up the process. Standard deviation is a statistic that measures the dispersion of a dataset, relative to its mean. It's calculated as the square root of the variance (the spread of numbers in a dataset). Determining the variation between each data point relative to the mean is valuable for comparing sets of data that may have the same mean but a different range. For example, the mean of the following two data sets is the same, but the latter is clearly more spread out: 15, 15, 15, 14, 16, 7, 14, 22, 30 If the data points are further from the mean, the deviation within the dataset is higher. The more spread out the data, the higher the standard deviation, says Investopedia. Standard deviation is often used in finance. It's applied to the annual rate of return of an investment. The higher the standard deviation, the greater the variance between each price and the mean, which reveals a larger price range. Volatile stock has a high standard deviation, but blue-chip stock (a large company with a positive reputation) has a low standard deviation. Using standard deviation Standard deviation is used to strategize investing and trading, because it can help you measure market volatility. Analysts, portfolio managers, and advisors use standard deviation as a fundamental risk measure. Investment firms will even report the standard deviation of their mutual funds. The statistics are typically easy to understand, which is why it's useful to show them to clients and investors — and using Excel to calculate and display the standard deviation can be extremely valuable in terms of time management. How to calculate the standard deviation in Excel Excel makes calculating standard deviation more manageable. But first, it's important to understand the six standard deviation formulas in Excel. To calculate the sample standard deviation, use formulas in this category: STDEV.S, STDEVA, and STDEV.To calculate the standard deviation for an entire population, use formulas in this category: STDEV.P, STDEVPA, and STDEVP. The term population means that you're considering all the datasets in an entire population. If using the entire population is unrealistic or impossible, using a sample from the population (sample standard deviation) will work. Typically, you can find the standard deviation by using the sample data to calculate the standard deviation and then infer the entire population. Focusing on the more typical practice of using a sample of the data as opposed to the population, these are the three formulas — explained: STDEV.S. This formula is used when data is numeric, which means that it will ignore text and logical values.STDEVA. This formula is used when text and logical values are included in the calculation along with numbers. Text and "FALSE" are read as 0, and TRUE is understood as 1.STDEV. This formula is compatible with older versions of Excel (2007 or prior) but completes the same function as STDEV.S (which is used in any Excel software after 2007). Using the STDEV.S function To reiterate, STDEV.S uses numerical values and ignores text and logical values. The syntax of the STDEV.S function used in Excel is STDEV.S(number1,[number2],...). Number1. This number is a mandatory argument in the formula. The first number corresponds to the first element of the sample. Instead of arguments separated by commas, a named range, single array, or a reference to an array can be used here.Number2. This is the optional argument in the formula. These can refer to a data point, a named range, a single array, or a reference to an array. Up to 254 additional arguments can be used. In practice Say there's a dataset for a range of weights from a sample of a population. Using the numbers listed in column A, the formula will look like this when applied: =STDEV.S(A2:A10). In return, Excel will provide the standard deviation of the applied data, as well as the average. If the average was 150, and the standard deviation is 2, that would mean that most people in the group were within the weight range of 150-2 or 150+2. Pro Tip When a formula is entered into a cell, it will also appear in Excel's Formula bar. Always make sure to include an equal sign when entering a formula. For more information on using formulas in Excel, and other useful tricks for mastering the software, check out JotForm's Excel guide. This article is originally published on Feb 11, 2020, and updated on Oct 27, 2020.



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