

How do I calculate the weighted standard deviation in Excel?

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Calculating the weighted standard deviation in Excel involves using a mathematical formula to determine the measure of dispersion for a set of data, taking into account the importance or weight of each data point. This is useful in situations where certain data points hold more significance or influence over the overall data set. Excel provides a built-in function, the "STDEV.S" function, which can be used to calculate the weighted standard deviation by inputting the data set and corresponding weights. This allows for a more accurate representation of the variability of the data. By using the appropriate formula and Excel's built-in function, one can easily calculate the weighted standard deviation and gain valuable insights into the distribution of the data.

Calculate Weighted Standard Deviation in Excel

The weighted standard deviation is a useful way to measure of values in a dataset when some values in the dataset have higher weights than others.

The formula to calculate a weighted standard deviation is:

$$\sqrt{\frac{\sum_{i=1}^N w_i (x_i - \bar{x}^*)^2}{\frac{(M-1)}{M} \sum_{i=1}^N w_i}},$$

where:

N: The total number of
M: The number of non-zero weights
w_i: A vector of weights
x_i: A vector of data values
x̄: The weighted mean

The following step-by-step example shows how to calculate a weighted standard deviation in Excel.

Step 1: Create the Data

First, let's create a column of data values along with their weights:

	A	B	C	D	E	F
1	Data Values	Weights				
2	14	1				
3	19	1				
4	22	1.5				
5	25	2				
6	29	2				
7	31	1.5				
8	31	1				
9	38	2				
10	40	3				
11	41	2				
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Step 2: Calculate the Weighted Mean

Next, we can use the following formula to calculate the weighted mean:

=SUMPRODUCT(A2:A11, B2:B11) / SUM(B2:B11)

The weighted mean turns out to be 31.147:

	A	B	C	D	E	F	G	H	I	J
1	Data Values	Weights								
2	14	1		Weighted Mean	31.147	=SUMPRODUCT(A2:A11, B2:B11) / SUM(B2:B11)				
3	19	1								
4	22	1.5								
5	25	2								
6	29	2								
7	31	1.5								
8	31	1								
9	38	2								
10	40	3								
11	41	2								
12										
13										
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22										

Step 3: Calculate the Weighted Standard Deviation

Next, we can use the following formula to calculate the weighted standard deviation:

$$=SQRT(SUMPRODUCT((A2:A11-E2)^2, B2:B11) / SUM(B2:B11, -1))$$

	A	B	C	D	E	F	G	H	I	J	K
1	Data Values	Weights									
2	14	1		Weighted Mean	31.147						
3	19	1		Weighted Standard Deviation	8.570	=SQRT(SUMPRODUCT((A2:A11-E2)^2, B2:B11) / SUM(B2:B11, -1))					
4	22	1.5									
5	25	2									
6	29	2									
7	31	1.5									
8	31	1									
9	38	2									
10	40	3									
11	41	2									
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19											

And if you'd like to calculate the weighted variance, it's simply $8.5702^2 = 73.44$.