How do you calculate the standard deviation of a frequency distribution in Excel?

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To calculate the standard deviation of a frequency distribution in Excel, first organize the data into a table with two columns: one for the categories or values and one for the corresponding frequencies. Then, use the formula =STDEV.P(range of frequencies) where "range of frequencies" refers to the cells containing the frequency data. This will give you the standard deviation of the distribution. Alternatively, you can use the built-in function STDEV.P(array) and input the entire frequency distribution as an array. The standard deviation is a measure of the spread or variability of the data and can help identify any outliers or unusual values.

Excel: Calculate Standard Deviation of Frequency Distribution

Often you may want to calculate the standard deviation of a frequency distribution in Excel.

For example, suppose you have the following frequency distribution:

	A	B	C	D
1	**Lower Class Limit**	**Upper Class Limit**	**Frequency**	
2	1	10	2	
3	11	20	7	
4	21	30	10	
5	31	40	3	
6	41	50	1	
7				
8				
9				
10				
11				
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14				
15				
16				

The following step-by-step example shows how to calculate the standard deviation of this frequency distribution in Excel.

Step 1: Enter Values for Frequency Distribution

First, we'll enter the class limits and frequency values for our frequency distribution:

	A	B	C	D
1	**Lower Class Limit**	**Upper Class Limit**	**Frequency**	
2	1	10	2	
3	11	20	7	
4	21	30	10	
5	31	40	3	
6	41	50	1	
7				
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Step 2: Calculate Mean of Frequency Distribution

We can use the following formula to estimate the mean of our frequency distribution:

Mean: Σmini / N

where:

mi: The midpoint of the ith groupni: The frequency of the ith groupN: The total sample size

To apply this formula in Excel, we will type the following formulas into cells D2, E2, and F2:

D2: =AVERAGE(A2:B2)E2: =D2*C2F2: =SUM($E$2:$E$6)/SUM($C$2:$C$6)

We will then click and drag these formulas down to each remaining cell in each column:

	A	B	C	D	E	F
1	Lower Class Limit	Upper Class Limit	Frequency (n_i)	m_i	$m_i * n_i$	μ
2	1	10	2	5.5	11	22.8913
3	11	20	7	15.5	108.5	22.8913
4	21	30	10	25.5	255	22.8913
5	31	40	3	35.5	106.5	22.8913
6	41	50	1	45.5	45.5	22.8913
7						
8						
9						
10						
11						

Step 3: Calculate Standard Deviation of Frequency Distribution

Standard Deviation: $\sqrt{\Sigma ni(mi-\mu)2 / (N-1)}$

where:

ni: The frequency of the ith groupmi: The midpoint of the ith groupμ: The meanN: The total sample size

To apply this formula in Excel, we will type the following formulas into cells G2, H2, and I2:

G2: =D2-F2H2: =G2^2I2: =C2*H2

We will then click and drag these formulas down to each remaining cell in each column:

	A	B	C	D	E	F	G	H	I
1	Lower Class Limit	Upper Class Limit	Frequency (n_i)	m_i	$m_i * n_i$	μ	m_i - μ	$(m_i - \mu)^2$	$n_i(m_i - \mu)^2$
2	1	10	2	5.5	11	22.8913	-17.3913	302.4575	604.9149
3	11	20	7	15.5	108.5	22.8913	-7.3913	54.63138	382.4197
4	21	30	10	25.5	255	22.8913	2.608696	6.805293	68.05293
5	31	40	3	35.5	106.5	22.8913	12.6087	158.9792	476.9376
6	41	50	1	45.5	45.5	22.8913	22.6087	511.1531	511.1531
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9									
10									
11									
12									

Lastly, we can type the following formula into cell B8 to calculate the standard deviation of this frequency distribution:

=SQRT(SUM(I2:I6)/(SUM(C2:C6)-1))

The following screenshot shows how to use this formula in practice:

B8 =SQRT(SUM(I2:I6)/(SUM(C2:C6)-1))

	A	B	C	D	E	F	G	H	I
1	**Lower Class Limit**	**Upper Class Limit**	**Frequency (n_i)**	**m_i**	**$m_i * n_i$**	**μ**	**$m_i - \mu$**	**$(m_i - \mu)^2$**	**$n_i(m_i - \mu)^2$**
2	1	10	2	5.5	11	22.8913	-17.3913	302.4575	604.9149
3	11	20	7	15.5	108.5	22.8913	-7.3913	54.63138	382.4197
4	21	30	10	25.5	255	22.8913	2.608696	6.805293	68.05293
5	31	40	3	35.5	106.5	22.8913	12.6087	158.9792	476.9376
6	41	50	1	45.5	45.5	22.8913	22.6087	511.1531	511.1531
7									
8	**Std. Dev**	9.637705925							
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13									

The standard deviation of this frequency distribution turns out to be 9.6377.

The following tutorials explain how to perform other common tasks in Excel: