

Formulas for Statistical Variation

An element of a data set will be represented as x_i , where i represents the i^{th} term of the data set.

The arithmetic mean of a data set will be represented by μ .

Examples of summation notation

$$\sum_{i=1}^5 i = 1 + 2 + 3 + 4 + 5 \qquad \sum_{i=1}^4 x_i = x_1 + x_2 + x_3 + x_4$$

Mean absolute deviation = $\frac{\sum_{i=1}^n |x_i - \mu|}{n}$, where μ represents the mean of the data set, n represents the number of elements in the data set, and x_i represents the i^{th} element of the data set.

Variance (σ^2) = $\frac{\sum_{i=1}^n (x_i - \mu)^2}{n}$, where μ represents the mean of the data set, n represents the number of elements in the data set, and x_i represents the i^{th} element of the data set.

Standard deviation (σ) = $\sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n}}$, where μ represents the mean of the data set, n represents the number of elements in the data set, and x_i represents the i^{th} element of the data set.

z-score (z) = $\frac{x - \mu}{\sigma}$, where x represents an element of the data set, μ represents the mean of the data set, and σ represents the standard deviation of the data set.

Calculator Steps

Finding Mean Absolute Deviation (MAD)	
1) Enter data in a list such as L_1 using [STAT][EDIT].	
2) Press [STAT][CALC][1 -VAR Stats] for the list to calculate stats.	
WAY 1	WAY 2
3) Enter the formula $SUM(ABS(L_1 - \bar{x}))/n$ (Use [VARS][5: Statistics] to find $\bar{x}$ and n ; use [2^{nd}][LIST][5:sum] to find sum; use [MATH][NUM][1:abs] to find abs) (Or use the CATALOG button!)	3) Press  to move to L_2 .
	4) Press  to highlight L_2 . Press [ENTER] to get $L_2=$ at the bottom of the screen.
	5) Press   to get to NUM, then press [1: abs(].
	6) Press [2^{nd}][1] to get L_1 , then - (minus sign) [VARS][5:Statistics][2: $\bar{x}$]
	7) Press [)] [ENTER]. L_2 will fill with data that is equivalent to $abs(L_1 - \bar{x})$
	8) Press [STAT][CALC][1 - Var Stats][2^{nd}][L_2] [ENTER] (run stats for L_2)
	9) $\bar{x}$ represents the MAD

Finding Standard Deviation (σ)	Finding Variance
1) Enter data in a list such as L_1 using [STAT][EDIT].	1) Find the standard deviation as described at left (σ).
2) Press [STAT][CALC][1 -VAR Stats] The default list is L_1 ; if you want to find the stats for other lists you must enter its name.	2) Square the standard deviation and you have the variance (σ^2). • One way to do this is to press [VARS][5:Statistics][4:σ]. • Then press the x^2 button and ENTER to square it.
3) Statistics will scroll. The standard deviation is listed next to σ (Note: do not use Sx , as this is standard deviation for a sample, which is beyond the scope of this course).	
NOTE: Interpretation of scrolled statistics	
$\bar{x}$ = mean Σx = sum of all the x values Σx^2 = sum of all the x^2 values	Sx =sample standard deviation (don't use) σx = population standard deviation (use this!) n = number of data points