

FINDING THE VARIANCE AND STANDARD DEVIATION OF A SINGLE SET OF DATA VALUES

The following data set gives the ages (in years) of ten brides at their first marriage:

31.8 24.5 26.7 21.3 45.6 35.9 22.5 33.1 42.3 30.6

We want to find the variance and standard deviation of the sample data set. Remember variance and standard deviation are based on the goal of finding the “average deviation” of data from the mean of the data set. Therefore, **STEP 1** will be to enter the data into the calculator so that we can use the calculator to assist us.

STEP 1: Enter Data into a List

Enter data into the calculator by pushing the **STAT** key and choosing option 1—**Edit**. Hit **ENTER**. (Screen 1)

Screen 1



After typing in each data element, hit **ENTER**. Continue until all data has been entered into L1. (Screen 2) Use **2nd - QUIT** (above **MODE**) to quit your list.

Screen 2

L1	L2	L3	1
45.6			
35.9			
22.5			
33.1			
42.3			
30.6			
.....			
L1(1) =			

STEP 2: Find the Sum of the List

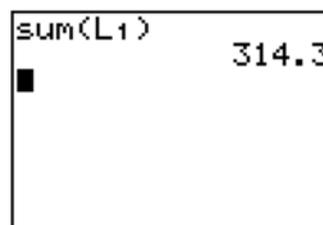
To find the mean we must add up the values in the data set then divide by the number of elements in the sample, in this case ten.

Find the sum of a list using the following sequence:

2nd - LIST (above **STAT**) > **MATH** > option 5 (**SUM**) > **2nd L1** > **)** > **ENTER**

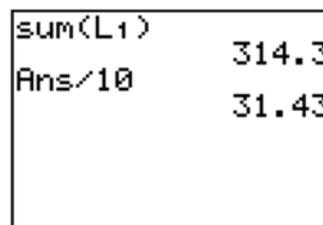
(Screen 3)

Screen 3



Next hit the division symbol **/**, then **10**, then **ENTER** to find the mean of the sample set. (Screen 4)

Screen 4



The mean of the sample data is 31.43 years.

STEP 3: Find the deviations squared of each element from the mean

Tip: DO NOT ROUND your answer. On intermediate steps of calculations do not use rounded numbers.

Therefore, we will use 31.43 to compute the deviations squared for each data element. Go to the data lists: type **STAT > 1-Edit > ENTER** (Screen 5)

We will have the calculator compute the deviations squared in L2. Do the following:

Highlight **L2**. (Screen 6)

Now type: **(L1 - 31.43)²** (Screen 7)

Hit **ENTER**. (Screen 8)

The calculator has just calculated all the deviations squared for the data in the sample.

STEP 4: Find the sum of the deviations squared

Since we are trying to compute an average, we must find the sum of the deviations squared. Type the following:

First: **2nd - QUIT** (above **MODE**) to quit your list.

Then: **2nd - LIST** (above **STAT**) **> MATH > 5-sum > L2 >** **ENTER** (Screen 9)
In this case, 595.301 is the sum of the deviations squared.

STEP 5: Find the variance

We now are ready to find the “average deviation” by dividing. Remember, however this is a sample and the average we find is a “fudged average” because we divide by $n - 1$ (9 for this data sample) rather than n (which is 10). (Note: If this data set was a population, we would have divided by 10.)

Hit the division symbol **/**, then **9**, and then **ENTER**. (Screen 10)

The answer showing is s^2 , the variance of the sample. The variance is in square units. (Interpretation: The ages in the sample deviate from mean an average of 66.1 square years.)

Screen 5

L1	L2	L3	1
31.8	-----	-----	
24.5			
26.7			
21.3			
45.6			
35.9			
22.5			
L1()=31.8			

Screen 6

L1	L2	L3	2
31.8	-----	-----	
24.5			
26.7			
21.3			
45.6			
35.9			
22.5			
L2 =			

Screen 7

L1	L2	L3	2
31.8	-----	-----	
24.5			
26.7			
21.3			
45.6			
35.9			
22.5			
L2=(L1-31.43) ²			

Screen 8

L1	L2	L3	2
31.8	48.025	-----	
24.5	22.373		
26.7	102.62		
21.3	200.79		
45.6	19.981		
35.9	79.745		
22.5			
L2()=.1369			

Screen 9

SUM(L2)	595.301
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Screen 10

SUM(L2)	595.301
Ans/9	66.14455556

STEP 6: Find the standard deviation

Remember, the standard deviation is obtained by taking the square root of the variance. To complete the process and put the answer into years, you will do the following:

2^{nd} - $\sqrt{\quad}$ (above x^2) > 2^{nd} - **ANS** (above the (-) key next to **ENTER**) > **ENTER**

(Screen 11)

8.132930318 rounded to two decimal places is 8.13. Therefore, $s = 8.13$ is the standard deviation of the sample data set. (Interpretation: Ages in the data set deviate from the mean of 31.43 years by an average of 8.13 years.)

Screen 11

SUMΣL2?	595.301
Ans/9	66.14455556
$\sqrt{\text{Ans}}$	8.132930318