

Name: _____

Date: _____

12.4 NOTES: Standard Deviation (Variance of Data)

Algebra 1

Measures of central tendency give us numbers that describe the typical data value in a given data set. But, they do not let us know how much **variation** there is in the data set. For example two data sets can have the same **mean** but look radically different depending on how varied the numbers are in the set. The **range** can be used to indicate **variation** in the data, however, **outliers** can make this value misleading.

Exercise 1: Find the mean and range for the following sets of data.

<u>Data Set 1</u>	<u>Data Set 2</u>
0, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 20	7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13
Mean:	Mean:
Range:	Range:

The Inter-Quartile Range (IQR), on the other hand, doesn't generally include outliers, and is considered a better **measure of variance**. Find the inter-quartile range and identify any outliers in the sets of data.

<u>Data Set 1</u>	<u>Data Set 2</u>
0, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 20	7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13
IQR:	IQR:
Upper Boundary:	Upper Boundary:
Lower Boundary:	Lower Boundary:

The best way to measure **variance** is to calculate the data's **Standard Deviation**.

Standard Deviation (σ)

The **standard deviation** of a data set tells us, on **average**, how **far a data point** is **away** from the **mean** of the data set. The **larger** the **standard deviation**, the **greater** the **variation** within the data set.

<u>Data Set 1</u>	<u>Data Set 2</u>
0, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 20	7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13
Standard Deviation (σ):	Standard Deviation (σ):

Exercise 2: Create a Dot Plot associated with the following data.

Survey Question: How many siblings do you have?

Data (# of siblings):



- What is the mean (\bar{x}) of the data set?
- What is the sum (Σ) of the data values?
- What is the standard deviation of the data set (σ)?
- What percentage of students fall within one standard deviation (in either direction) of the mean?

Exercise 3: Find Standard Deviation “by hand”

$$\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

σ = standard deviation

Σ = sum of

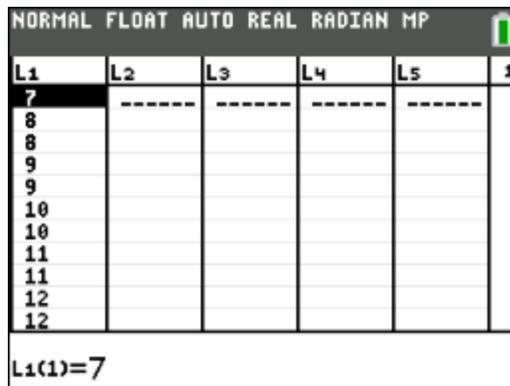
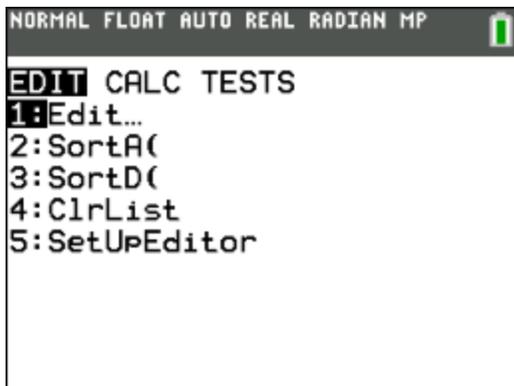
x = each value in data set

\bar{x} = mean of all values in the data set

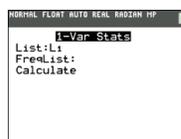
Data	$x - \bar{x}$	$(x - \bar{x})^2$	$\sum (x - \bar{x})^2$	Variance $\frac{\sum(x - \bar{x})^2}{n}$	Standard Deviation $\sqrt{\frac{\sum(x - \bar{x})^2}{n}}$
7			Calculate the sum of the third column.	Divide the sum in the fourth column by how many numbers there are in the data set.	Take the square root of the variance.
8					
8					
9					
9					
10					
10					
11					
11					
12					
12					
13					

How do you find the mean (\bar{x}), sum of the data values (Σ), and standard deviation (σ) using your graphing calculator?

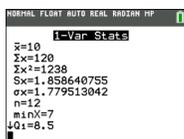
1. Press **STAT** and then **1: Edit...** to enter data into **L₁** (List 1).



Press **STAT**, arrow right to **CALC**, press **1: 1-Var Stats**, and then **ENTER**. To use data from list 1 you should see **List: L₁**. If you see another list number like **L₂** or **L₃**, you will need to change it to **L₁** by pressing 2nd and then 1. Arrow down to **calculate**, and press **ENTER**.



2. Look for the **Mean (\bar{x})**, **Sum (Σx)**, and **Standard Deviation (σx)**.



Bell Curve

