



**Objective: Dispersion with Standard Deviation**

**Homework ST-4 – NYA p.637 #1 – 4, 5a, 5b**

**Do Now: Find the mean (average):**

1. 98, 92, 94, 89, 91, 91

2. 100, 60, 98, 98, 99, 100

**Exam Prep: Which graph shows all the data elements of the set?**

A) histogram    B) box and whisker plot    C) line plot    D) frequency table



You are a useless human being if you don't have a calculator.

It was hot outside the first day you needed one.... but that was before winter. It will be required on the next exam as well.

**Dispersion** describes the “spread” of the data. What can you say about the data in the “Do Now”?

**Range** is a basic measure of dispersion, it is the difference of the maximum and the minimum. It is a poor measure of dispersion because it only uses two values.

**Standard deviation** is a measure that uses all of the data, and it tells you how far a value is from the mean. The symbol is lowercase sigma ( $\sigma$ ).

$$\sigma = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}}$$

$n$  = number of values in set

$\bar{x}$  = mean

$\sigma$  = standard deviation

**Note:** Do not hand-calculate standard deviation...

## SD on the TI Calculator

1. Press **[STAT]** and choose “edit...” to enter your data.
2. “Quit” to the home screen
3. Press **[STAT]** and scroll to “CALC” and choose “1-Var Stats”
4. Choose your list number **[2nd] [1]** for L<sub>1</sub> or list 1. List 1 is the default.

Note: You will find the 5-number summary below it (including range).

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">L1</td> <td style="width: 25%;">L2</td> <td style="width: 25%;">L3</td> <td style="width: 25%;">3</td> </tr> <tr> <td style="text-align: center;">2 3 4 5 6 7 8 9 10 12</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> <td></td> </tr> <tr> <td colspan="4">L3(1)=</td> </tr> </table>	L1	L2	L3	3	2 3 4 5 6 7 8 9 10 12	-----	-----		L3(1)=				<pre style="font-family: monospace;"> 1-Var Stats x̄=6.5 Σx=39 Σx²=337 Sx=4.086563348 σx=3.730504881 ↓n=6                     </pre>	<p>mean = <math>\bar{x}</math></p> <p>standard deviation = <math>\sigma_x</math>.</p>
L1	L2	L3	3											
2 3 4 5 6 7 8 9 10 12	-----	-----												
L3(1)=														

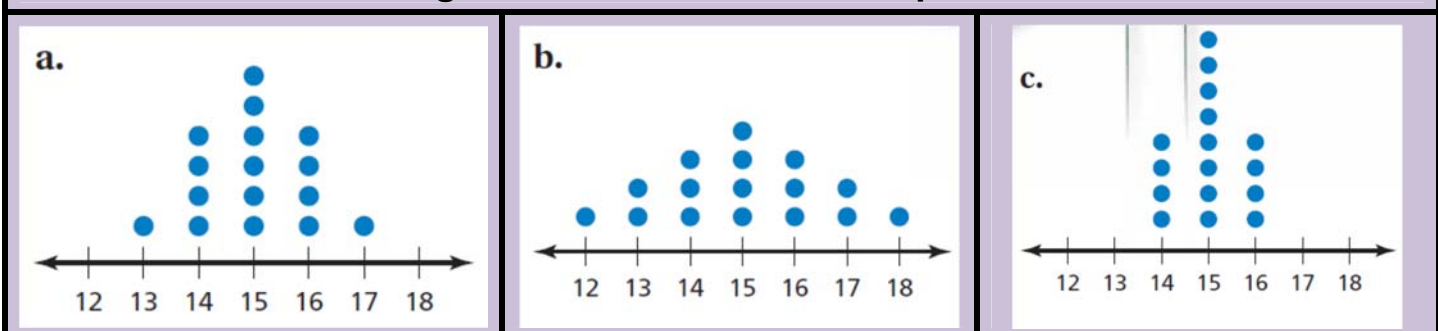
## Practice

1. Enter the “Do Now” data into L<sub>1</sub> and L<sub>2</sub>.
2. Confirm the means are equal and record the SD of both.
3. Describe how the sets are different.
4. Would the range be enough to describe dispersion?

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">L1</td> <td style="width: 25%;">L2</td> <td style="width: 25%;">L3</td> <td style="width: 25%;">1</td> </tr> <tr> <td style="text-align: center;">98 92 94 89 91 91</td> <td style="text-align: center;">100 60 98 98 99 100</td> <td style="text-align: center;">-----</td> <td></td> </tr> <tr> <td colspan="4">L1(?)=</td> </tr> </table>	L1	L2	L3	1	98 92 94 89 91 91	100 60 98 98 99 100	-----		L1(?)=				<pre style="font-family: monospace;"> 1-Var Stats x̄=92.5 Σx=555 Σx²=51387 Sx=3.146426545 σx=2.872281323 ↓n=6                     </pre>	<pre style="font-family: monospace;"> 1-Var Stats x̄=92.5 Σx=555 Σx²=52609 Sx=15.94678651 σx=14.55735782 ↓n=6                     </pre>
L1	L2	L3	1											
98 92 94 89 91 91	100 60 98 98 99 100	-----												
L1(?)=														

## Critical Thinking

Which data set has the greatest SD? The least? Explain.



### Critical Thinking

In which office are you more likely to wait 25 minutes or more? Explain.

Location	Mean Wait Time	Standard Deviation
The Doctor's Office	19 min	2.5 min
The Cat's Office	18 min	5.5 min

### Extra Practice

Find the mean and range of each data set. Then compare the data sets.

5. Heights (in inches) of two teams

Tigers: 67, 70, 65, 72, 74, 68, 67, 69

Centaurs: 74, 71, 68, 63, 75, 63, 65, 73

6. Numbers of fish caught during a week

Crew A: 120, 100, 75, 112, 135, 80, 106

Crew B: 104, 140, 159, 135, 158, 165, 140