

3.2 – Measures of Variation

– **measures of variance** → represents how spread out or scattered a set of data is.

- range – represents the difference between greatest and least values
- variance (σ^2) – describe how far the data deviates (varies) from mean and represented by $\sigma^2 = \frac{\sum (x - \bar{x})^2}{n}$
- standard deviation (σ) – same description as variance but represented by $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$

Note: You can do this by hand using formulas above but using the 1-Variable Stats in calculator will be faster and more efficient. I expect you to find the variance and standard deviation via calculator.

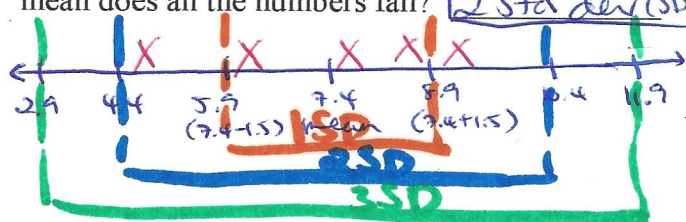
Examples: Find the measures of variance for each set of data to answer question(s) about variance.

1.) Use the following list of numbers: $\bar{x} = 7.4$

6.9, 8.7, 7.6, 4.8, 9.0

a.) range = 4.2 std. dev = 1.5 vari = 2.25
 $9 - 4.8$ $\sigma = 1.5$ $\sigma^2 = 1.5^2$

b.) Within how many standard deviations from the mean does all the numbers fall? 2 std dev (SD)



2.) Below are the weights of different offensive lineman of football teams from three high schools:

Jackson: 170, 165, 140, 188, 195
 Washington: 144, 177, 215, 225, 197
 King: 166, 175, 196, 206, 219

a.) SD = 19.3 SD = 28.7 SD = 19.5

b.) How would the school with the most variation of weights impact their play for games?

Washington HS has biggest SD - if everyone play can really be big diff - but if most weighted player gets hurt and can't play could effect the outcome of game
variation will be lower.

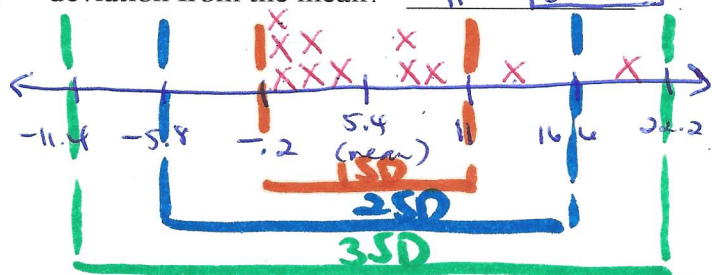
3.) Table shows the population in millions of different states from the 2000 Census: $\bar{x} = 5.4$

State	Population	State	Population	State	Population
NY	19.0	MD	5.3	RI	1.0
PA	12.3	CT	3.4	DE	0.8
NJ	8.4	ME	1.3	VT	0.6
MA	6.3	NH	1.2	—	—

a.) range = 18.4 std. dev = 5.6 vari = 31.3
 $19 - 0.6$ 5.6^2

b.) How many states fell within two standard deviations from the mean? 10 states

c.) What percent of the states fell within one standard deviation from the mean? $\frac{9}{11} = \underline{81.8\%}$



4.) Table shows the class scores on a test:

Score	Frequency
90	3
85	2
80	3
75	7
70	6
65	4

$\bar{x} = 75.4$

Total =
25 scores

a.) range = 25 std. dev = 7.7 vari = 59.3
 $90 - 65$ 7.7^2

b.) What percent of the scores fell within one standard deviation from the mean? $\frac{14}{25} = \underline{64\%}$

c.) What percent of the scores fell within two standard deviations from the mean? $\frac{25}{25} = \underline{100\%}$

