

3.2 – Measures of Variation aka Variance

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

- range – represents the difference between the greatest and least values.
- variance (σ^2) – describe how far the data deviates from the 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.

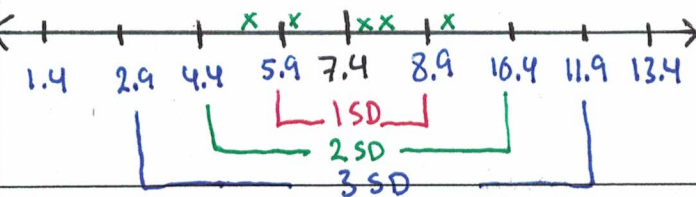
Examples: Find the measures of variance for each set of data to answer question(s) about variance.

* Add or subtract SD from the mean to make # line

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
 $9 - 4.8$ $\sigma_x = 1.503321638$ $\sigma^2 = (1.5)^2$
- b.) Within how many standard deviations from the mean does all the numbers fall? 2 SD



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

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

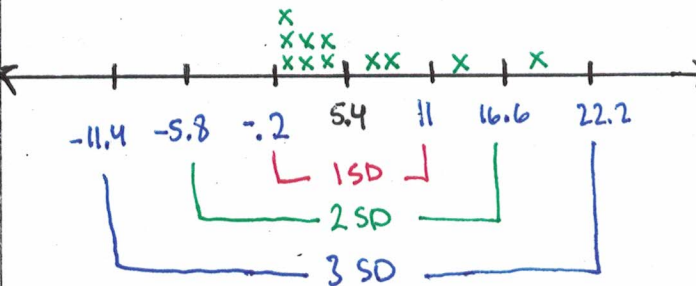
- a.) SD = 19.3 SD = 28.9 SD = 19.5
- b.) How would the school with the most variation of weights impact their play for games?

If the biggest player(s) leave, the variance / SD will decrease.

3.) Table shows the population in millions of different states from the 2000 Census:

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 = 31.4
 $\bar{x} = 5.4$ σ_x $(\sigma)^2 = (5.6)^2$
- 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? 9/11 ≈ 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

* MUST READ CHART CORRECTLY!
 90, 90, 90
 85, 85

 Total = 25

- a.) range = 25 std. dev = 7.7 vari = 59.29
 $\bar{x} = 75.4$ σ_x $(\sigma)^2 \rightarrow (7.7)^2$
- b.) What percent of the scores fell within one standard deviation from the mean? 16/25 ≈ 64%
- c.) What percent of the scores fell within two standard deviations from the mean? 100%

