Standard Deviation

Standard Deviation is a measure of the dispersion of a set of data from its mean. Standard deviation tells you how spread out the data values are from the mean and is denoted by the symbol σ

Types of Standard Deviation

- If the standard deviation is 0, then the data has no spread.
- If the standard deviation is small, then the data is close to the mean.
- If the standard deviation is large, then the data is more spread out from the mean.

How to Calculate a Sample Standard Deviation

- Calculate the mean $\bar{x}$
- Calculate each data value's deviation from the mean by finding $x - \bar{x}$ for each data value of x
- Find $(x - \bar{x})^2$, the square of each deviation
- Find the mean of the squared deviation $\frac{\sum (x - \bar{x})^2}{n-1}$
- Take the square root of the mean of the squared deviation

$$\sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

1) A data set has 4 numbers {2, 5, 6, 7 }. Find the standard deviation of the data.

n = # of terms or data points

$\bar{x} = \frac{2+5+6+7}{4}$

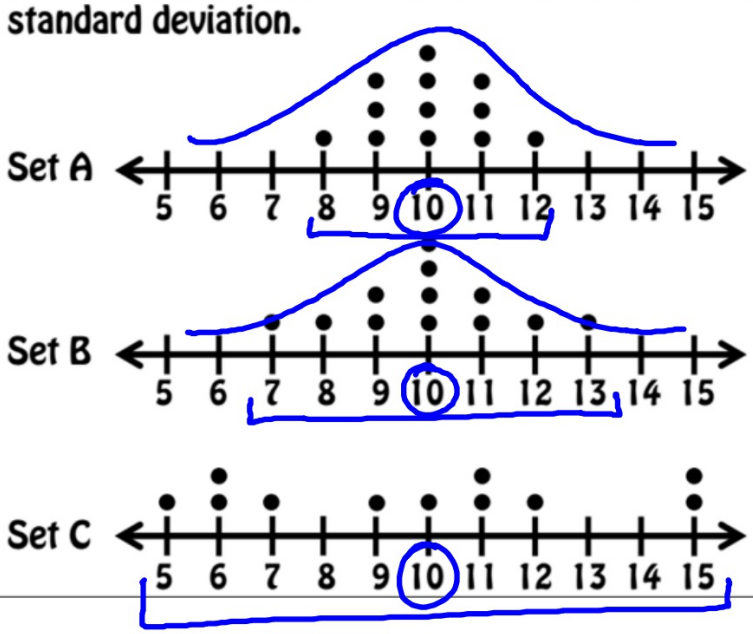
$\bar{x} = 5$

Data x	Data - Mean $x - \bar{x}$	(Data – Mean)^2 $(x - \bar{x})^2$
2	$2-5 = -3$	$(-3)^2 = 9$
5	$5-5 = 0$	$(0)^2 = 0$
6	$6-5 = 1$	$(1)^2 = 1$
7	$7-5 = 2$	$(2)^2 = 4$

$$\frac{\sum (x-\bar{x})^2}{n-1} = \frac{9+0+1+4}{4-1} = \frac{14}{3}$$

$$\sigma = \sqrt{\frac{14}{3}} = \boxed{2.16}$$

2) The mean of each set is 10. The standard deviations of the sets are 1.13, 1.65, and 3.49. Match each data set with its standard deviation.



$\sigma = 1.13$

$\sigma = 1.65$

$\sigma = 3.49$