**11.7 Standard Deviation**  
Objective: To find the standard deviation and variance of a set of values

To apply standard deviation and variance

**Measure of variation:** describes how data is spread out (example: range)

**Standard Deviation:** measure of how much the values in a data set vary ,or deviate, from the mean (x bar)   
  
**Variance:**  the square of the standard deviation

\*in other words, standard deviation is the square root of the variance

Steps to finding Variance/Standard Deviation

1. Find the mean of the values in the data set
2. Find the difference (x-x “bar”), between each value x and the mean
3. Square each difference
4. Find the average of these squares 🡨variance
5. Take the square root of the variance (step 4) 🡨 standard deviation

**Variance:**

**Standard Deviation:**

Note: The reason to square these differences is to take into account the overall distance/difference from the original mean.   
<http://www.mathsisfun.com/data/standard-deviation.html#WhySquare> 🡨great in depth explanation

Example:

What is the mean, variance and standard deviation of the following values?

8, 12, 10, 13, 9, 20

**Mean:** 72/6=12

**Variance:**

**Standard Deviation:**

What does this all mean?!

8, 9, 10, 12, 13, 20

-3SD -2SD -1SD Mean +1SD +2SD +3SD

0.486 4.084 8.042 12 15.958 19.916 23.514

We can see that the 20 is clearly the one that is different than the rest because all other numbers are right around 1 standard deviation of the mean and the 20 is beyond the 2nd standard deviation. It is important to note that all data falls within 3 standard deviations of the mean however. We’ll explore that in 11.10 and how this all can be applied to real life situations.

**HMWK: page 722 #1-5, 7-11 (odd), 21**