To find standard deviation:

1) find the variance
2) take the square root of the variance

$$\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

To calculate variance and/or standard deviation by hand, use this table. We will use the data set {10, 8, 6} with mean = 8

Data Point (x)	x - mean	$(x - mean)^2$	Sum
10	10 - 8 = 2	$2^2 = 4$	4
8	8 - 8 = 0	$0^2 = 0$	4 + 0
6	6 - 8 = -2	$-2^2 = 4$	4 + 0 + 4
			=8

Variance = 8/2 = 4

Standard Deviation = $\sqrt{4} = 2$

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Example 1:

Find the standard deviation for a group of friends who all just took the same math test.

Their grades were: 92, 88, 80, 68 and 52

Mean: 76

Deviation for each entry:

Square each deviation:

Sum up all the squared deviations:

$(92-76)^2 = 256$
$(88-76)^2 = 144$
$(80-76)^2 = 16$
$(68-76)^2 = 64$
$(52-76)^2 = 576$
1056

Divide the sum of squared deviations by (n-1) - this is the variance.

$1056 \div 4 = 264$

Find the square root of the variance. This is the S.D.

$S = 16.2$

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What does spread tell us about the data?

Consider another data set from a different class that took the same test. Their test scores were 92, 92, 92, 52 and 52

Mean = 76

What is the mean score for this class? What is the standard deviation for this data set?

$(92-76)^2 = 256$

$(92-76)^2 = 256$

$(92-76)^2 = 256$

$(52-76)^2 = 576$

$(52-76)^2 = 576$

Variance

$1920 \div 4 = 480$

$S = \sqrt{480} \approx 21.9$

Can you use what you know to estimate the standard deviation for another data set? Say a third class that took the test had test scores of 77, 76, 76, 76 and 75. What would you predict the standard deviation to be? What could this tell you about the 3 different classes?

Mean = 76

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$(77-76)^2 = 1$

$(76-76)^2 = 0$

$(76-76)^2 = 0$

$(76-76)^2 = 0$

$(75-76)^2 = 1$

Variance

$\frac{2}{4} = 0.5$

$S = \sqrt{0.5} \approx 0.7$