Standard Deviation
Use What You've Learned

After watching the video, *Standard Deviation*, complete the following problems.

1. Let $x_1 = 2$, $x_2 = 2$, $x_3 = 3$, $x_4 = 6$, $x_5 = 6$. The summation notation is used in the formula for standard deviation. Become more familiar with this notation by evaluating the following expressions.

   a. $\sum_{i=1}^{5} x_i$

   b. $\sum_{i=2}^{4} x_i$

   c. $\sum_{i=1}^{5} (x_i)^2$

   d. $\left(\sum_{i=1}^{5} x_i \right)^2$

   e. $\sum_{i=1}^{5} (x_i - 3)^2$

2. Every morning, I get out of bed and do sit-ups until I give up. Here is how it went last week:

Monday	140
Tuesday	179
Wednesday	150
Thursday	197
Friday	150
Saturday	40
Sunday	138

a. What is my mean number of sit-ups?

b. What is my standard deviation?

x_i	$x_i - \bar{X}$	$(x_i - \bar{X})^2$
140		
179		
150		
197		
150		
40		
138		

$$\sum (x - \bar{X})^2 =$$

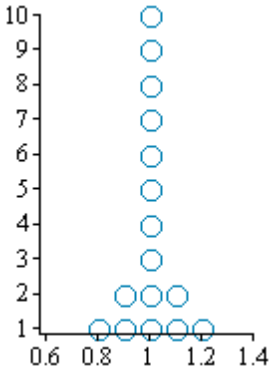
c. I don't think Saturday should count, because I was interrupted when my kitten jumped on me. If we eliminate Saturday from our data, what is my new standard deviation?

x_i	$x_i - \bar{X}$	$(x_i - \bar{X})^2$
140		
179		
150		
197		
150		
138		

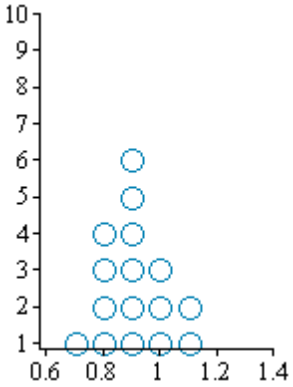
$$\sum (x - \bar{X})^2 =$$

d. Your answer to part c should have been smaller than your answer to part b. Why should we have known, before doing any calculations, that removing Saturday's result would cause the standard deviation to go *down*?

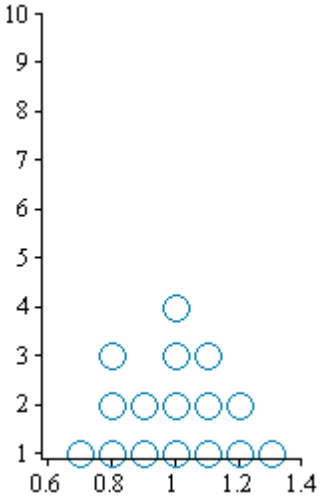
3. A government inspector has been assigned to four bakeries: Acme Bakers, Buns R Us, Croissant Your Heart, Do Do Donuts. Over a period of several months, she buys several "one-pound" loaves from each bakery and measures them precisely. Here are her results:



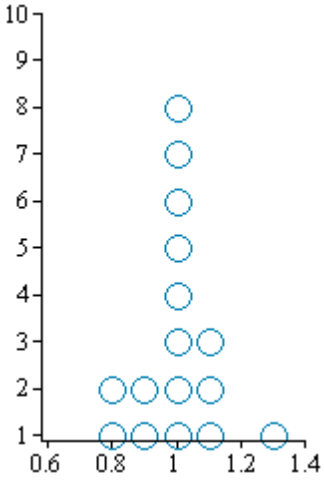
Acme Baker



Buns R Us



Croissant your Heart



Do Do Donuts

a. Estimate the mean weight of a "one-point loaf" from each bakery.

b. Order the bakeries by standard deviation from lowest to highest.

c. Which one of the bakeries most likely uses a machine to measure their dough? Explain your reasoning.

d. Which one of the bakeries most likely measures their dough by hand? Why?

e. The inspector issues a fine to one of the bakeries. Which bakery, and why?

4. Create a data set that contains six values, which has a mean of 10 and a standard deviation of zero.

5. Create a data set that contains six values, which has a mean of 0 and a standard deviation of one hundred.