Day 8 10/2
WARM UP

CC Math 1A
Boxplots Quiz Review

Name: _____

The following data gives the number of passing touchdowns for the 9 quarterbacks who threw the most touchdowns during the 2004 NFL season.

50, 31, 39, 30, 29, 28, 27, 27, 21

1) Find the 5-number summary for the data.

Minimum:
Lower Quartile:
Median:
Upper Quartile:
Maximum:

2) Create a box and whisker graph for the data. You may use a calculator.

3) Describe the box and whisker plot.
   a) Where is the center of the data?
   b) What is the spread of the data?
   c) What is the shape of the box and whisker plot?
   d) What does this box and whisker plot show about the number of passing touchdowns?

   e) What was the highest number of passing touchdowns for a quarterback?
   f) What percent of the quarterbacks threw more then 35 passes?
   g) What was the median number of passes?
   h) What percent of the quarterbacks threw between 27 and 35 passes?

4)

b. What's the interquartile range?

   $IQR = Q_3 - Q_1 =$ _____ − _____ = _____

c. Multiply the interquartile range by 1.5.

   $IQR * 1.5 =$ _____ * 1.5 = _____

d. **Subtract** this answer from the **lower quartile.**

   $Q_1 -$ _____ = _____

e. **Add** the answer from part c to the **upper quartile.**

   $Q_3 +$ _____ = _____

f. What are your outliers, if any? _____

Day 8 Notes - 10/2

Measures of Spread: Standard Deviation

So far in our study of numerical measures used to describe data sets, we have focused on the mean and the median. These measures of center tell us the most typical value of the data set. If we were asked to make a prediction about a member of a data set, we would use a measure of center to predict that value. However, measures of center do not give us the complete picture.

Consider the following test scores:

Student	Test 1	Test 2	Test 3	Test 4
Johnny	65	82	93	100
Will	82	86	88	84
Anna	80	99	73	88

Who is the best student? How do you know?

Thinking about the Situation

Discuss the following with your partner or group. Write your answers on your own paper. Be prepared to share your answers with the class.

What is the mean test score for each student?

Based on the mean, who is the best student?

If asked to select one student, who would you pick as the best student? Explain.

Usually we calculate the mean, or average, test score to describe how a student is doing. Johnny, Will, and Anna all have the same average. However, these three students do not seem to be "equal" in their test performance. One thing we can look at is how consistent each student is with their test performance. Does each student tend to do about the same on each test, or does it vary a lot from test to test? Measures of spread will give us that information.

Investigation: Calculating the Standard Deviation

Johnny's Data

Test	Value (x)	Deviations from the Mean Value – Mean $(x-\mu)$	Squared Deviations from the Mean (Value – Mean)^2 $(x-\mu)^2$
1	65	65-85 = -20	$(-20)^2 = 400$
2			
3			
4			
	Mean μ =	Sum $\sum(x-\mu)$ =	Sum $\sum(x-\mu)^2$ =

$$\text{average of squared deviations} = \frac{\text{sum of squared deviations}}{\text{number of data values}} = \frac{\sum(x-\mu)^2}{n} =$$

$$\sigma = \text{square root of } \left(\frac{\text{sum of squared deviations}}{\text{number of data values}}\right) = \sqrt{\frac{\sum(x-\mu)^2}{n}} =$$

Now repeat the process with Will and Anna's data.

Will's Data

Test	Value (x)	Deviations from the Mean Value – Mean $(x-\mu)$	Squared Deviations from the Mean (Value – Mean)² $(x-\mu)^2$
1			
2			
3			
4			
	Mean $\mu =$	Sum $\sum(x-\mu) =$	Sum $\sum(x-\mu)^2 =$

$$\text{average of squared deviations} = \frac{\text{sum of squared deviations}}{\text{number of data values}} = \frac{\sum(x-\mu)^2}{n} =$$

$$\sigma = \text{square root of } \left(\frac{\text{sum of squared deviations}}{\text{number of data values}}\right) = \sqrt{\frac{\sum(x-\mu)^2}{n}} =$$

Anna's Data

Test	Value (x)	Deviations from the Mean Value – Mean $(x-\mu)$	Squared Deviations from the Mean (Value – Mean)² $(x-\mu)^2$
1			
2			
3			
4			
	Mean $\mu =$	Sum $\sum(x-\mu) =$	Sum $\sum(x-\mu)^2 =$

$$\text{average of squared deviations} = \frac{\text{sum of squared deviations}}{\text{number of data values}} = \frac{\sum(x-\mu)^2}{n} =$$

$$\sigma = \text{square root of } \left(\frac{\text{sum of squared deviations}}{\text{number of data values}}\right) = \sqrt{\frac{\sum(x-\mu)^2}{n}} =$$

Discussion Questions:

1) Why is the sum of the third column always equal to zero?
2) Translate into words: $\sum(x-\mu)^2$.
3) Interpret Anna's standard deviation in context.
4) Who is the best student? How do you know?

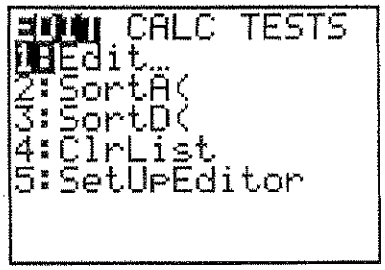
HOW TO FIND STANDARD DEVIATION IN CALCULATOR

Finding the mean, median, an standard deviation on the calculator.

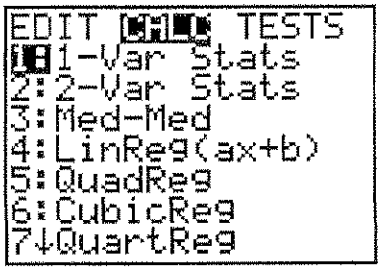
Enter the following data into L_1 in the calculator.

X
28
48
53
25
38
23
49
32

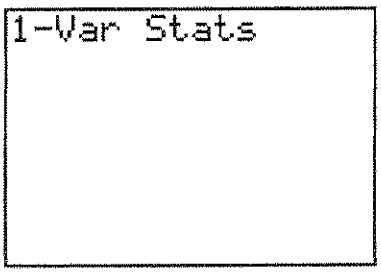
Step 1: The data should already be entered as lists in the calculator. Press STAT.



Step 2: Press right arrow button so that CALC is highlighted and the CALC menu appears (as shown). 1: 1-VAR STATS should already be highlighted.



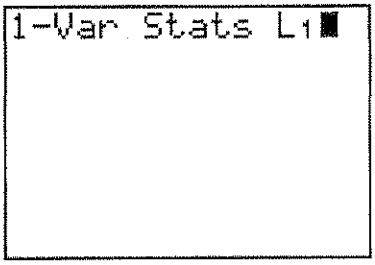
Step 3: Press ENTER. 1-VAR STATS will appear on the Home Screen.



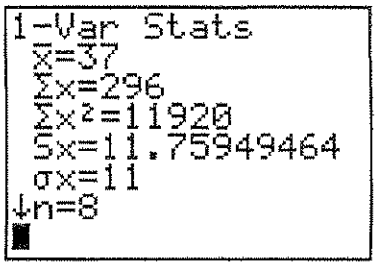
Step 4: Now enter the list names.

For this example, the data are stored in L1.

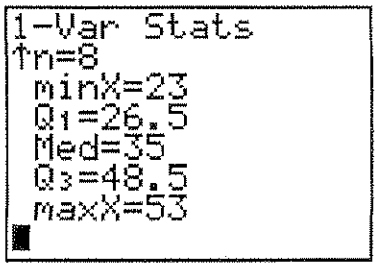
Notice above "1" on the number keypad is "L1" in yellow. Press the yellow 2ND button, then "1" on the keypad. L1 should appear on the screen.



Step 5: Press ENTER. 1-VAR STATS makes many calculations, more than can fit on a screen. Use the down arrow keys to see all the information.



- **Mean**
  - Notation: x with a bar above (the first thing listed under 1-VAR STATS
  - In this example, the mean is 37



- **Median**
  - Notation: MED
  - In this example, the median is 35

- **Standard Deviation**
  - Notation: Sx
  - In this example, the standard deviation is 11.759....

DAY 7 PRACTICE

If you have a graphing calculator you may use it. If not, do by hand

Find the mean, median, mode, range, and standard deviation of the data set.

1. The data set below gives the prices (in dollars) of cordless phones at an electronics store.

   35, 50, 60, 60, 75, 65, 80

2. The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season.

   51, 48, 47, 46, 45, 43, 41, 40, 40, 39

3. The data set below gives the waiting times (in minutes) of several people at a department of motor vehicles service center.

   11, 7, 14, 2, 8, 13, 3, 6, 10, 3, 8, 4, 8, 4, 7

4. The data set below gives the calories in a 1-ounce serving of several breakfast cereals.

   135, 115, 120, 110, 110, 100, 105, 110, 125