Statistical Measures

Measures of Central Tendency (Review)

You are already familiar with the following measures of central tendency. These statistics indicate where the data are centered.

Mean ($\bar{x}$). The mean (average) of a set of scores is the sum of the scores divided by the number of scores.

Median. The median of a set of scores is the middle score when the numbers are arranged in size order. If there is an even number of data values, as in $x = \{15,7,4,13,11,10\}$, the median is the average of the two middle scores: 4, 7 $\underbrace{10,11}_{\text{Median}=\frac{10+11}{2}=10.5}$ 13, 15

The *first quartile* (Q_1) is the median of the values of below the median.
The *third quartile* (Q_3) is the median of the values of above the median.

Examples: 11 $\underbrace{15}_{Q_1}$ 22 $\underbrace{31}_{\text{Median}}$ 32 $\underbrace{41}_{Q_3}$ 52

22 $\underbrace{34\ 39}_{Q_1=\frac{34+39}{2}=36.5}$ 56 $\underbrace{67}_{\text{Median}}$ 69 $\underbrace{72\ 84}_{Q_3=\frac{72+84}{2}=78}$ 87

Mode. The mode is the most frequently occurring score in a set. The mode of $\{2, 3, 1, 2, 4, 3, 5, 6, 2, 5\}$ is 2, since 2 appears more times than any other value in the list. Some data sets have no mode and others will have multiple modes.

Consider the following IQ scores: 118, 122, 125, 127, 128, 130

a) Find the mean ($\bar{x}$) for the six scores:

b) Find the *range* of the six scores.

c) Find the distance from the mean, $x_i - \bar{x}$, for each:

x_i	$\bar{x}$	$x_i - \bar{x}$		
118				
122				
125				
127				
128				
130				

Measures of Dispersion

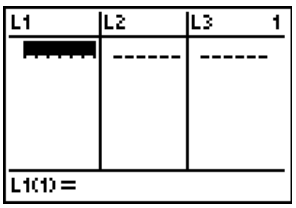
The range and standard deviation are measures of dispersion since these statistics describe how spread out the data are.

Range. The range of a set of scores is the difference between the largest and smallest scores.

Standard Deviation. The standard deviation of a set of scores is a statistic that measures how far apart the individual scores are from the mean. If the data represent an entire population (for example, the scores of an entire class), the *population standard deviation*, denoted σ_x, is used. Sometimes it is impractical to collect data for the entire population, so a representative sample would be used to collect information about the entire population. In these cases, the *sample standard deviation*, denoted S_x, is used.

Using the Graphing Calculator:

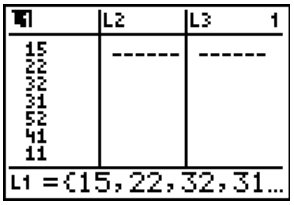
1. Data are stored in *Lists* on the calculator. Locate and press the STAT button on the calculator. Choose EDIT. The calculator will display the first three of six lists (columns) for entering data. Simply type your data and press ENTER. Use your arrow keys to move between lists.



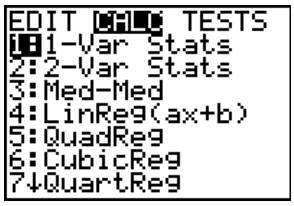
Data can also be entered from the home screen using set notation --

{15, 22, 32, 31, 52, 41, 11} → L1

(where → is the STO key)



2. Press the STAT button. Choose CALC at the top. Select 1-Var Stats. Notice that you are now on the home screen. Specify the list you wish to use by choosing the 2nd button and the list name:



1-Var Stats L1

(Note: If you omit the list name, the calculator uses L_1 by default.)

Press ENTER and view the calculations. Use the down arrow to view all of the information.

$\bar{X}$	the mean
$\sum X$	the sum of the data
$\sum X^2$	the sum of the squares of the data
Sx	the sample standard deviation
σ_x	the population standard deviation
n	the sample size (# of pieces of data)
$\min X$	the smallest data entry
Q_1	data at the first quartile
med	data at the median (second quartile)
Q_3	data at the third quartile
$\max X$	the largest data entry