III. The median

A. The median is the middle number of data arranged into an array.

B. The median as a measure of central tendency
   1. The median may be thought of as the geometric middle while the mean is the arithmetic middle.
   2. The geometric nature of the median results in it not being influenced by a few large numbers at either extreme.

C. Determining the median
   1. Arrange the data into an array.
   2. Determine the median's position using this expression. $\frac{n}{2} + .5$
   3. Count this number of spaces from either extreme to find the median. An even number for n will result in the location being halfway between two numbers. Add the numbers and divide by 2 to determine the median.

D. Example
   1. Linda Smith wants to calculate last week's median number of self-help rentals.
   2. Daily self-help rentals from page 10 were 3, 7, 7, 4, 1, 8, and 5.

Array: 1, 3, 4, 5, 7, 7, 8

$\frac{n}{2} + .5 = \frac{7}{2} + .5 = 4 \rightarrow 5$

The arrow means go to the array. Counting from either direction, the fourth number is 5.

IV. The mode

A. The mode is the value occurring most often.

B. It was 7 for self-help tape rentals.

C. Some data sets have no modes while others have two **(bimodal)** or more **(multimodal)** modes.

D. For many data sets, the mode is not a good representation of the data's middle value. As a result, it is the least used measure of central tendency. However, knowing the value that occurred most often is often of interest.

V. Measures of position

A. These measures locate interesting points along data arranged into an array.

B. The median is an example.

C. **Quartiles** separate data into quarters.
   1. Q_1 separates the first and second quarters.
   2. Q_2, the median, separates the second and third quarters.
   3. Q_3 separates the third and fourth quarters.

Quartile	Location	Finding the quartiles for the above data	Analysis
Q_1	$\frac{n}{4} + .5$	$\frac{7}{4} + .5 = 1.75 + .5 = 2.25 \rightarrow 3.25$	Note: 3.25 is .25 of the distance between 3, the second number, and 4, the third number.
Q_2	$\frac{n}{2} + .5$	$\frac{7}{2} + .5 = 3.5 + .5 = 4 \rightarrow 5$	This data is not symmetrical. It is a coincidence that the mean and median are equal.
Q_3	$\frac{3n}{4} + .5$	$\frac{21}{4} + .5 = 5.25 + .5 = 5.75 \rightarrow 7$	Note: 7 is .75 of the distance between 7 and 7.

D. **Interquartile range**
   1. The interquartile range is the difference between Q_3 and Q_1.
   2. $Q_3 - Q_1 = 7 - 3.25 = 3.75$

E. **Deciles** separate data into tenths. The 3rd decile would be calculated as follows: $\frac{xn}{10} + .5 = \frac{3(7)}{10} + .5 = 2.6 \rightarrow 3.6$

F. **Percentiles**
   1. Percentiles separate data into 100 parts.
   2. Let x equal the percentile of interest.
   3. The location of the x percentile would be stated as follows: $\frac{xn}{100} + .5$
   4. The 90th percentile of daily self-help rentals would be

$$\frac{xn}{100} + .5 = \frac{90(7)}{100} + .5 = \frac{630}{100} + .5 = 6.8 \rightarrow 7.8$$

Note: Computer software may use different formulas to locate the position of data. As a result, their answers for measures of position may differ slightly from these answers.