

3.1 Measures of Central Tendency with work

3.1 Measures of Central Tendency: Mode, Median, & Mean

Essential Question:

When do you use each measurement style?

Focus Points:

- Compute mean, median, and mode from raw data by hand and with the calculator.
- Interpret what mean, median, and mode tells you.
- Explain how mean, median, and mode can be affected by extreme data values.
- What is a trimmed mean? How do you compute it?
- Compute a weighted average.

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The **mode** of a data set is the value that occurs most frequently.

If a data set has no single value that occurs more frequently than any other, then the data set has **no mode!**

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Example 1: Word Mode

5 3 7 2 4 4 2 4 8 3 4 3 4

mode = 4

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The **median** is the middle number, or the average of the middle numbers. The notation \tilde{x} (**x tilde**) is sometimes used to notate the median number.

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HOW TO FIND THE MEDIAN

The median is the central value of an ordered distribution.

1. Order the data from **smallest to largest**.
2. For an **odd** number of data values in the distribution, \tilde{x} = Middle data value
3. For an **even** number of data values in the distribution, **Median** = $\frac{\text{Sum of middle two values}}{2}$

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Example 2: Consumers Report

Find the median of BBQ flavored potato chips and price per ounce in cents:

19 19 27 28 18 35

~~18~~ ~~19~~ (19 27) ~~28~~ ~~35~~ $\tilde{x} = \frac{19+27}{2} = 23$

lowest overall taste rating costs \$.35 per ounce. Find the new median given the data below:

18 27 19 28 19

~~18~~ ~~19~~ (19 27) ~~28~~ $\tilde{x} = 19$

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The **mean (arithmetic mean)** is the average that uses exact values of all data entries.

$$\text{Mean} = \bar{x} = \frac{\text{Sum of all entries}}{\text{Number of entries}}$$

↑
"x bar"

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Example 3: Student Grades

To graduate, Linda needs at least a "B" in biology. She did not do very well on her first three test; however, she did well on the last four. Here are her scores:

58 67 60 84 93 98 100

Compute the mean and determine if Linda's grade will be a "B" (80 to 89 average) or a "C" (70 to 79 average).

$$\bar{x} = \frac{58 + 67 + 60 + 84 + 93 + 98 + 100}{7} = \frac{560}{7} = 80$$

Yes, Linda earns a "B".

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HOW TO FIND THE MEAN

1. Compute $\sum x$ that is, find the sum of all the data values.
2. Divide the sum total by the number of data values.

Sample statistic \bar{x}

population parameter $\mu = M_u$

$$\bar{x} = \frac{\sum x}{n}$$

$$\mu = \frac{\sum X}{N}$$

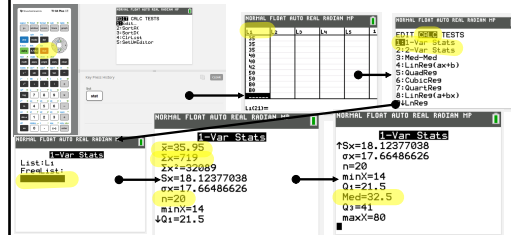
where n = number of data values in the sample

N = number of data values in the population

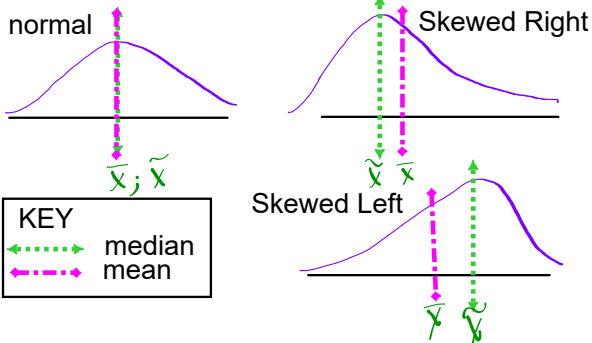
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Calculator steps median and mean

14 20 20 20 20 23 25 30 30 30
35 35 35 40 40 42 50 50 80 80



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What do averages tell us?

An average provides a one-number summary of a data set.

- the **mode** tells us the single data value that occurs most frequently in the data set. The value of the mode is completely determined by the data value that occurs most frequently. no mode if equal frequencies.
- the **median** tells us the middle value of a data set that has been arranged in order from smallest to largest. The median is affected by only the relative position of data values. Not influenced by other data values.
- the **mean** tells us the value obtained by adding up *all* the data and dividing by the number of data. The mean is very influenced by other data values. If adding a number to all numbers it is the same as adding that number to the average.

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HW: pg. 95: 1, 5, 7, 9, 11, 15, 17, 19

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