

Chapter 3

Averages and Variation

Understanding Basic Statistics
Fifth Edition

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FIFTH EDITION

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Measures of Central Tendency

- Average – a measure of the *center value* or *central tendency* of a distribution of values.
- Three types of average:
- Mode – most common, occurs most
- Median – middle * # in order list
- Mean – Average = Add together & Divide by how many values



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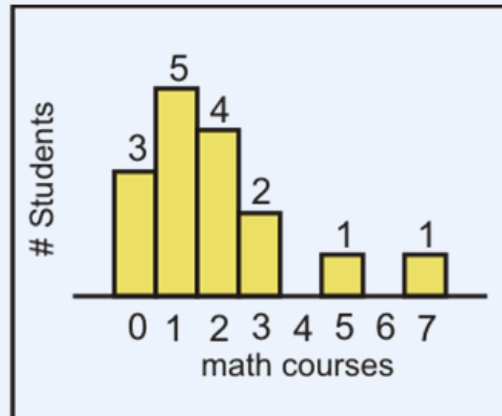
Mode

The mode is the most frequently occurring value in a data set.

Example: Sixteen students are asked how many college math classes they have completed.

{0, 3, 2, 2, 1, 1, 0, 5, 1, 1, 0, 2, 2, 7, 1, 3}

The mode is 1.



Median

Finding the median:

1). Order the data from smallest to largest.

2). For an odd number of data values:

Median = Middle data value

3). For an even number of data values:

~~*~~ Median = $\frac{\text{Sum of middle two values}}{2}$



1 Answer?

Median

Find the median of the following data set.

{ 4, 6, 6, 7, 9, 12, 18, 19 }

a). 6

b). 7

c). 8

d). 9



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Mean

Sample mean

Population mean

$$\bar{x} = \frac{\sum x}{n} \quad \text{Sum} \rightarrow \quad \text{# of values}$$

$$\mu = \frac{\sum x}{N} \quad \text{Sum} \rightarrow \quad \text{# of values}$$



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2 Answer?

Mean

Sample mean

Population mean

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

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

Find the mean of the following data set.

{3, 8, 5, 4, 8, 4, 10}

a). 8 B). 6.5 c). 6 d). 7



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Trimmed Mean

- Order the data and remove k% of the data values from the bottom and top.
- 5% and 10% trimmed means are common.
- Then compute the mean with the remaining data values.

5% Trimmed mean
Remove 1 value Top/Bottom
Add remaining & ÷ by 18

2.0 data value

10% = Move decimal to left 1 spot
Remove 2 values Top & Bottom
Add the remaining values & ÷ by 16



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Resistant Measures of Central Tendency

- A resistant measure will not be affected by extreme values in the data set.
- The mean is not resistant to extreme values.
- The median is resistant to extreme values.
- A trimmed mean is also resistant. *to outliers*



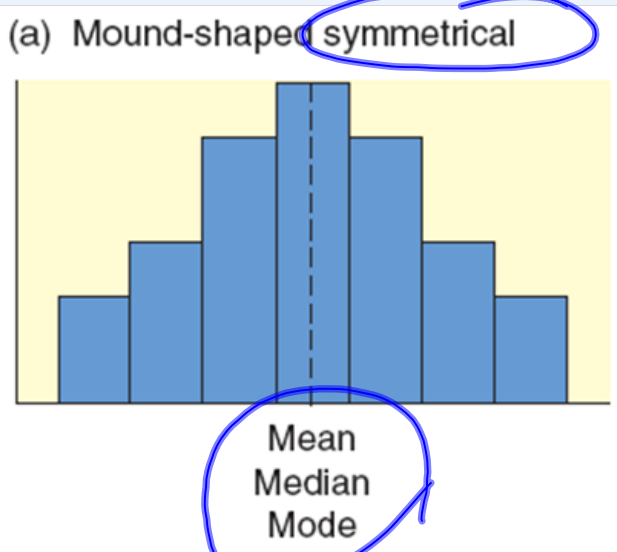
Critical Thinking

- Four levels of data – nominal, ordinal, interval, ratio (Chapter 1)
- Mode – can be used with all four levels.
- Median – may be used with ordinal, interval, of ratio level.
- Mean – may be used with interval or ratio level.



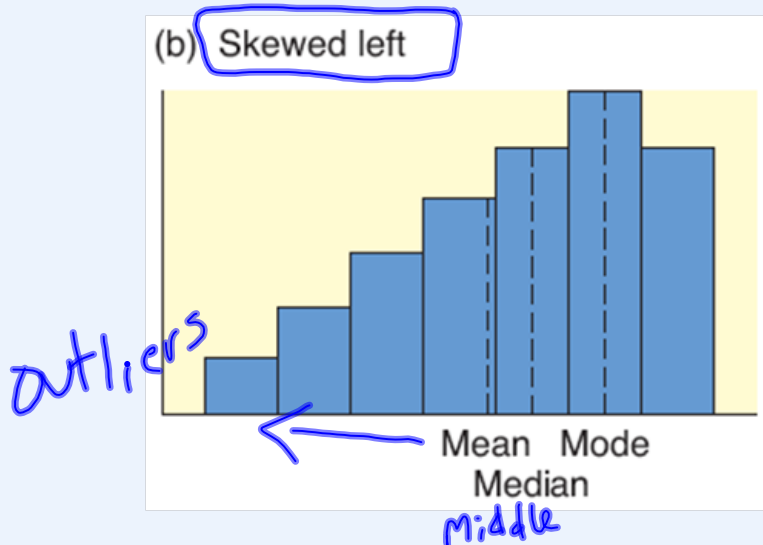
Critical Thinking

- Mound-shaped data – values of mean, median and mode are nearly equal.



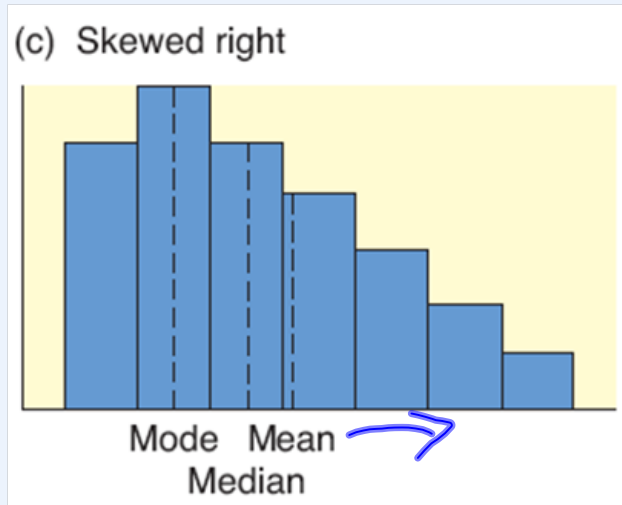
Critical Thinking

- Skewed-left data – mean < median < mode.



Critical Thinking

- Skewed-right data – mean > median > mode.



outliers



Weighted Average

- At times, we may need to assign more importance (weight) to some of the data values.

$$\text{Weighted Average} = \frac{\sum xw}{\sum w}$$

*change the % to a decimal Before you mult.

- x is a data value.
- w is the weight assigned to that value.

Grades

Att: 10% work habits: 10%
 HW: 20%
 Quiz: 20%
 T&ST: 30%

