

11.1 Measures of Center & Variation

Core Concepts

measure of center

a measure that represents the center of a set of data
mean or median or mode

mean 19, 17, 11, 14, 6, 11

average add up
total #

$$\frac{19+17+11+14+6+11}{6} = \frac{78}{6} = \boxed{13}$$

median 19, 17, 11, 14, 6, 11

middle when lined up

6, 11, 11, 14, 17, 19

$$\frac{11+14}{2} = \frac{25}{2} = \boxed{12.5}$$

mode 19, 17, 11, 14, 6, 11

"most" frequently occurring

11

if 19, 17, 11, 14, 6, 11, 14

11 and 14

if 19, 17, 11, 14, 6, 11, 14, 14 14 only

outlier 19, 17, 11, 14, 6, 11

a # that is extremely too high or low compared to the others

"6" might be an outlier

measure of variation

a measure that describes the "spread" distribution of the data

range 19, 17, 11, 14, 6, 11

difference from highest to lowest

$$19 - 6 = \boxed{13}$$

standard deviation 19, 17, 11, 14, 6, 11

measure of each number to the mean

mean			
x	$\bar{x}$	difference	$(*)^2$
19	13.4	5.6	31.36
17	13.4	3.6	12.96
11	13.4	-2.4	5.76
14	13.4	0.6	0.36
6	13.4	-7.4	54.76
11	13.4	-2.4	5.76

Total Sum

110.96

$$\frac{110.96}{6} = 18.49$$

total # of numbers

$$\sqrt{18.49} \approx \boxed{4.3004}$$

is the Standard Deviation

Extra Practice

1. Consider the data set: 2, 5, 16, 2, 2, 7, 3, 4, 4

9 numbers

- a. Find the mean, median, and mode of the data set.

$$\begin{array}{r}
 2 \ 3 \\
 5 \ 4 \\
 16 \ 4 \\
 2 \ 4 \\
 + 2 \ 4 \\
 \hline
 45
 \end{array}$$

$$\begin{array}{r}
 45 \\
 9 \\
 \hline
 5
 \end{array}$$

mean

2, 2, 2, 3, 4, 4, 5, 7, 16

median

mode = most occurring

2

- b. Determine which measure of center best represents the data. Explain.

median = 4

would be the best representation
of a center for this data set.
since it is in the middle of the data.

2. The table shows the masses of eight gorillas.

Masses (kilograms)							
160	157	162	158	44	160	159	161

- a. Identify the outlier. How does the outlier affect the mean, median, and mode?

44...

Mean is affected the most by an outlier.

Mode is not changed.

Median is barely touched.

- b. Describe one possible explanation for the outlier.

maybe it's the baby

3. The heights of the members of two girls' basketball teams are shown. Find the range of the heights for each team. Compare your results.

Team A Heights (inches)									
58	75	60	48	56	78	60	57	54	59

$$78 - 48 = 30 \text{ inches}$$

Team B Heights (inches)									
49	50	70	56	58	66	64	57	62	63

$$\begin{array}{r}
 70 \\
 - 49 \\
 \hline
 21 \text{ inches}
 \end{array}$$

Team A... has the tallest person on the teams and the range is bigger than Team B... meaning there is a bigger height difference

4. Consider the same data set

Team A Heights (inches)									
58	75	60	48	56	78	60	57	54	59

Team B Heights (inches)									
49	50	70	56	58	66	64	57	62	63

a. Finish finding the standard deviation of the heights of Team A. Interpret your result.

Find
mean

$$\frac{605}{10}$$

$$= 60.5$$

x	$\bar{x}$	difference	$()^2$
58	60.5	-2.5	6.25
75	60.5	14.5	210.25
60	60.5	-0.5	0.25
48	60.5	-12.5	156.25
56	60.5	-4.5	20.25
78	60.5	17.5	306.25
60	60.5	-0.5	0.25
57	60.5	-3.5	12.25
54	60.5	-6.5	42.25
59	60.5	-1.5	2.25

total
sum

$$\frac{756.5}{10} = 75.65$$

$$\text{and } \sqrt{75.65} = 8.6977$$

The height of players
differs from the mean
by about 8.6977
inches

b. Find the standard deviation of the heights of Team B. Interpret your result.

mean

$$\frac{595}{10}$$

$$= 59.5$$

x	$\bar{x}$	difference	$()^2$
49	59.5	-10.5	110.25
50	59.5	-9.5	90.25
70	59.5	10.5	110.25
56	59.5	-3.5	12.25
58	59.5	-1.5	2.25
66	59.5	6.5	42.25
64	59.5	4.5	20.25
57	59.5	-2.5	6.25
62	59.5	2.5	6.25
63	59.5	3.5	12.25

Total
Sum 412.5

$$\frac{412.5}{10} = 41.25$$

$$\text{and } \sqrt{41.25} = 6.4226$$

The height of players
on B team differs from
the mean by about
6.422 inches

c. Compare the standard deviations for Team A and Team B. What can you conclude?

The heights on team A have a higher
variation than on the B team.

This tells me that there is a bigger difference
in height between the players