Quiz

Statistics

We measure center and spread (or variability).

Center	Spread
mean	range
mode	IQR
median	MAD

A **measure of spread** tells us how much a data sample is spread out or scattered. We can use the range and the interquartile range (IQR) to measure the spread of a sample. Measures of spread together with measures of location (or central tendency) are important for identifying key features of a sample to better understand the population from which the sample comes from.

EQ: How can I find the mean absolute deviation of a set of data?
What does it tell us about the data?

MEAN ABSOLUTE DEVIATION

MEAN ABSOLUTE DEVIATION (MAD)

The mean absolute deviation of a data set is the average of the absolute value of the differences between that element and the mean of the data.

$$\text{MAD} = \frac{\left|x_1 - \overline{x}\right| + \left|x_2 - \overline{x}\right| + \left|x_3 - \overline{x}\right| + ... + \left|x_n - \overline{x}\right|}{n}$$

where $x_1, x_2, x_3, ..., x_n$ are elements of the data

n is the number of elements in data

$\overline{x}$ is the mean of the data

EQ: How can I find the mean absolute deviation of a set of data? What does it tell us about the data?

Mean Absolute Deviation

The Mean Absolute Deviation (MAD) of a set of data is the average distance between each data value and the mean.

The steps to find the MAD include:
1. find the mean (average)
2. find the difference between each data value and the mean
3. take the absolute value of each difference
4. find the mean (average) of these differences

$$\text{Population MAD} = \frac{1}{n}\sum_{i=1}^{n}|x_i - \bar{x}|$$

Find the mean of the populations, $\bar{x} =$ ___2.5___   2.54

Population of Largest U.S. Cities (millions)				
1.5	3.8	1.3	1.6	2.9
1.4	0.9	2.3	8.4	1.3

$n = 10$

$x - 2.5$

Population of the Largest U.S. cities, x	Deviation from the mean $x - \bar{x}$	Absolute value of the deviations from the mean $|x - \bar{x}|$
1.5	-1	1
3.8	1.3	1.3
1.3	-1.2	1.2
1.6	-.9	.9
2.9	.4	.4
1.4	-1.1	1.1
.9	-1.6	1.6
2.3	-.2	.2
8.4	5.9	5.9
1.3	-1.2	1.2

SUM = 14.8

Find the mean of these absolute deviations.

Mean Absolute Deviation

MAD = $\dfrac{14.8}{10}$ = 1.48 ≈ 1.5

Example 2: The table shows the number of Calories in several sandwiches at two restaurants. Find the MAD for each set of data.

Number of Calories per Sandwich											
Susan's Sub Shop						The Picnic Basket					
490	380	270	430	510	410	550	320	470	430	610	290

What does the MAD tell us about each set of data?

Susan $\bar{x} =$ 415

Picnic basket $\bar{x} =$ 445

x	$x - \bar{x}$	$|x - \bar{x}|$
490		75
380		35
270		145
430		15
510		95
410		5
	Total =	370

$$\frac{370}{6}$$

$$MAD = 61.\overline{6}$$
$$\approx 62$$

x	$x - \bar{x}$	$|x - \bar{x}|$
550		105
320		125
470		25
430		15
610		165
290		155
	Total =	590

$$\frac{590}{6}$$

$$MAD = 98.\overline{3}$$
$$\approx 98$$

Example 3: The chart below shows the average age of people at a meeting. Find the measures of central tendency, range, IQR, create a box and whisker plot and determine if any outliers exist. Find the MAD for the data set.

Ages of People at the Meeting

26	26	33	22	25
30	40	30	23	27
26	25	30	41	24

x	$x - \bar{x}$	$|x - \bar{x}|$

Mean ( ):

Median:
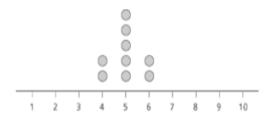
Mode:

IQR:

MAD:

1st Quartile:

3rd Quartile:

Box and Whisker Plot:

Each line plot below has 9 elements and a mean =5. Of the three, which line plot's data has the least variation from the mean? Which has the most variation from the mean?

Explain.

By computing the MAD, we can figure out exactly how much the numbers in the line plot differ from the mean.

x	$x - \bar{x}$	$|x - \bar{x}|$

x	$x - \bar{x}$	$|x - \bar{x}|$

x	$x - \bar{x}$	$|x - \bar{x}|$

Homework #4

Statistics Worksheet