Chapter 8: Mean, Median & Mode

We will also look at measures of variation that tell us the "spread" of the data:

Range

Standard deviation

- **Mode -** The mode of a set of data is the most repeated observation(s) or item(s).
  Find the mode of the following sets of numbers:

  2, 4, 6, 8, 8, 10, 12 → $\boxed{8}$

  2, 2, 3, 4, 4, 4, 5, 6, 6 → $\boxed{4}$

- **Median -** The median of a set of observations is the observation in the center or middle of the list after they have been placed in some kind of meaningful order. It has the symbol $\tilde{X}$ called "x-tilde."

  Find the median of the following sets of data:

  1, 2, 3, 3, 5, 6, 7, 9, 9 $\rightarrow \tilde{X} = 5$

  2, 6, 4, 7, 8, 1, 2, 9 ---- 1, 2, 2, 4, $\boxed{6, 7,}$ 8, 9 = 4+6 = 10 ÷ 2 = $\tilde{X} = 5$

- **Arithmetic Mean** - The arithmetic mean is found by totaling the observations in a set of data and then dividing the total by the number of items in the original list. This average has its own symbol $\bar{X}$called "x-bar."
  Find the arithmetic mean of the following sets of data and round your answer to one decimal place:

  3, 4, 5, 5, 7, 8, 9, 11, 0, 15

  2.3, 6, 7.3, 4, 6, 7, 6.3

- **Weighted Mean -** In some situations, data items may vary in degree of importance, or weight. For example, a final exam might be 25% of your final average in a particular course, whereas each test may count for 20% and homework 15%.

We use the following formula for computing weighted means:

$$\bar{x} = \frac{\sum (w \cdot x)}{\sum w}$$

Here, w represents weights and x represents data points.

Range – the range of a set of data is the difference between the highest and the lowest number in the data set. R = (highest number) – (lowest number)

Calculate the range of each set.

Number set	Numbers
A	5, 5, 5, 5, 5 **R = 5 - 5 = 0**
B	6, 5, 5, 5, 4 **R = 6 - 4 = 2**
C	7, 6, 5, 4, 3 **R = 7 - 3 = 4**
D	-7, -6, -5, -4, -3 **R = -3 - (-7) = 4**

Standard Deviation - a rough measure of the average amount by which observations in a set of data deviate from mean average value of the group. This deviation may be either above or below the mean.

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

The set of numbers is: $8, 6, 0, 2, 9$

1. **Find $\bar{x}$:** $\bar{x} = \frac{8+6+0+2+9}{5} = \frac{25}{5} = 5$
2. **Create Chart:**

Data: x	Data – Mean: $x - \bar{x}$	(Data - Mean)^2: $(x - \bar{x})^2$
8	8 – 5 = 3	$(3)^2 = 9$
6	6 – 5 = 1	$(1)^2 = 1$
0	0 – 5 =	$(5)^2 = 25$
2	2 – 5 = -5	$(2)^2 = 4$
9	9 – 5 = 4	$(4)^2 = 16$
Total	0	60

3. **Divide the total on the (Data - Mean)^2 column by n – 1 (*n: is the sample size*)**

$$\frac{60}{5-1} = \frac{60}{4} = \frac{30}{2} = 15$$

4. **Take the square root of the result above**

$$\sqrt{15} \approx \boxed{3.9}$$