Section 12.4
Measures of Dispersion

Measures of Dispersion indicate the extent to which values are spread around a central value such as mean.

-Examples: Interquartile Range, Range, Mean Deviation, Variance, and Standard Deviation.

Range and IQR are not very reliable to look at because they only use two data values.

-Write the formulas down in your notes from today

Mean Deviataion
-gives the average (mean) amount that the values in a data set differ from the mean.

Definition: the mean deviation of $x_1, x_2, ..., x_n$ is the mean of the absolute values of the differences between the values and the mean, $\overline{x}$.

$$\text{mean deviation} = \frac{1}{n} \sum_{i=1}^{n} |x_i - \overline{x}|$$

$\sum$ -symbol called the sum

n- value of the data which you are trying to find the mean deviation for

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The table lists student's test scores in History. Find the range and mean deviation for the test scores.

History
85
91
96
85
93

To find Mean Deviation:

-1. Find the mean (add them up and divide by the total):

$$\overline{x} = 90$$

-2. Make a table to find the absolute values of the differences from the mean.

(absolute value of the difference with the mean) 20/5

x_i	$|x_i - \overline{x}|$
85	|85 - 90|=5
91	|91 - 90| = 1
96	|96 - 90| = 6
85	|85 - 90| = 5
93	|93 - 90| = 3
Total:	20

Divide the total by n (how many values):
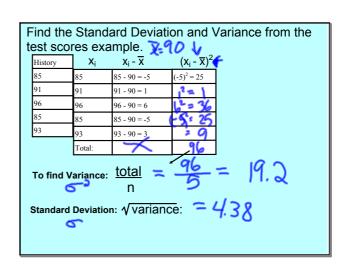
Mean Deviation = 4

Range:
High - Low
96 - 85 = 11

Variance and Standard Deviation:

-If a data set has n values, and a mean of x, then the variance and standard deviation are:

① variance: $\sigma^2 = \frac{1}{n} \sum_{i=1}^{n} (x_i - x)^2$

② Standard Deviation: $\sigma = \sqrt{\sigma^2}$

Find the Standard Deviation and Variance from the test scores example. $\overline{x} = 90$

History	x_i	$x_i - \overline{x}$	$(x_i - \overline{x})^2$
85	85	85 - 90 = -5	$(-5)^2 = 25$
91	91	91 - 90 = 1	$1^2 = 1$
96	96	96 - 90 = 6	$6^2 = 36$
85	85	85 - 90 = -5	$(-5)^2 = 25$
93	93	93 - 90 = 3	$= 9$
	Total:		96

To find Variance: σ^2 $\dfrac{\text{total}}{n} = \dfrac{96}{5} = 19.2$

Standard Deviation: $\sqrt{\text{variance}}$: $\sigma = 4.38$

Hwk: pg. 796 - 797
6 - 20 every 4th, 27 - 28

May 1-5:05 PM