

TOPIC: STANDARD DEVIATION

Calculating Sample Standard Deviation

◆ Recall: Mean & Median are **Measures of Center**, but often you'll need to more about the distribution of values.

► Standard Deviation (___) is a **Measure of Variation**, how _____ out #s are. $s \geq 0$ ($s \uparrow$, more “spread out”)

13 14 15 16 17

$$\bar{x} = 15 \quad s = 1.58$$

[LESS | MORE] spread out

5 10 15 20 25

$$\bar{x} = 15 \quad s = 7.91$$

[LESS | MORE] spread out

EXAMPLE

Find the (A) mean & (B) standard deviation of the sample {5, 10, 12, 14, 3, 4}

Standard Deviation

Easier to use!

Shorter, more calculations

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

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

x	x^2	$x - \bar{x}$	$(x - \bar{x})^2$
5			
10		$10 - 8 = 2$	$(2)^2 = 4$
12		$12 - 8 = 4$	$(4)^2 = 16$
14		$14 - 8 = 6$	$(6)^2 = 36$
3		$3 - 8 = -5$	$(-5)^2 = 25$
4		$4 - 8 = -4$	$(-4)^2 = 16$
48			

◆ For populations, you may see σ , μ , and N instead of s , \bar{x} , and n . Unless explicitly stated, use s equation.

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PRACTICE

An economist analyzes the quarterly GDP growth over the past 5 quarters, shown below. Calculate the standard deviation of the data.

Quarterly GDP Growth				
1.80%	2.50%	2.10%	1.90%	2.30%

Recall

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

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

EXAMPLE

You take 3 samples of students taking a quiz. The histograms below show the # of correct answers. Without calculating s , rank the standard deviations of each sample from least to greatest.

