

Learning Goal: For the distribution of a quantitative variable, describe the overall pattern (shape, center, and spread) and striking deviations from the pattern.

Specific Learning Objective: Estimate and calculate the standard deviation from the mean.

The *average deviation from the mean* (ADM) is a rough estimate of the *standard deviation from the mean* (SD). Here are the formulas.

$$ADM = \frac{\sum |x - \bar{x}|}{n}, \quad SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}.$$

Warm-up:

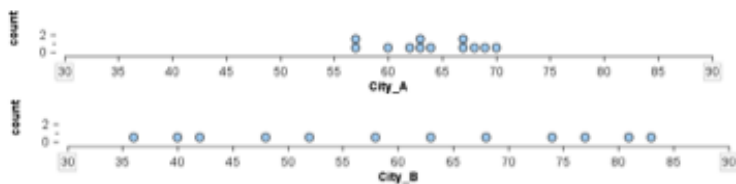
- 1) Use the standard deviation formula above to calculate the standard deviation for the following set of numbers. The mean \bar{x} is 10.

$$\{5, 6, 10, 11, 18\}$$

Group work:

We will use technology to find the standard deviation of a data set, instead of calculating it by hand. So here we will practice problems that focus on the concept, instead of the mechanics.

- 2) Recall the City A is San Francisco and City B is New York City. The data shown here is the average of the highest temperatures for each month over a period of 10 years. If we calculate the SD for each distribution, we get 4.4 and 16.6 degrees. Which is the SD for San Francisco? How do you know? (See if you can answer this without doing any calculations!)

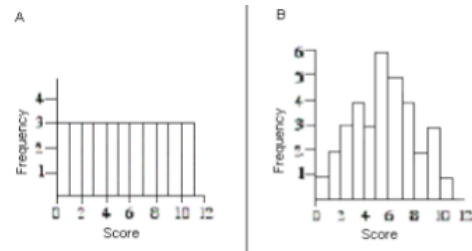


- 3) Which do you think will have a larger standard deviation? Why?

- a. The amount that a random sample of 30 LMC students spend per unit.

b. The amount that a random sample of 30 college students in the U.S. spend on per unit

4) Which distribution has the smaller standard deviation? Explain how you made your decision.



5) If the standard deviation of quiz scores on the Checkpoint 2.4 is zero, what do we know? Jot down a few notes to capture your thinking.

- a. everyone made a 100% on the quiz
- b. everyone failed the quiz
- c. everyone made the same score on the quiz
- d. it is impossible to tell

6) Describe in words what the standard deviation measures. (Think about how we have been estimating it in previous activities.)