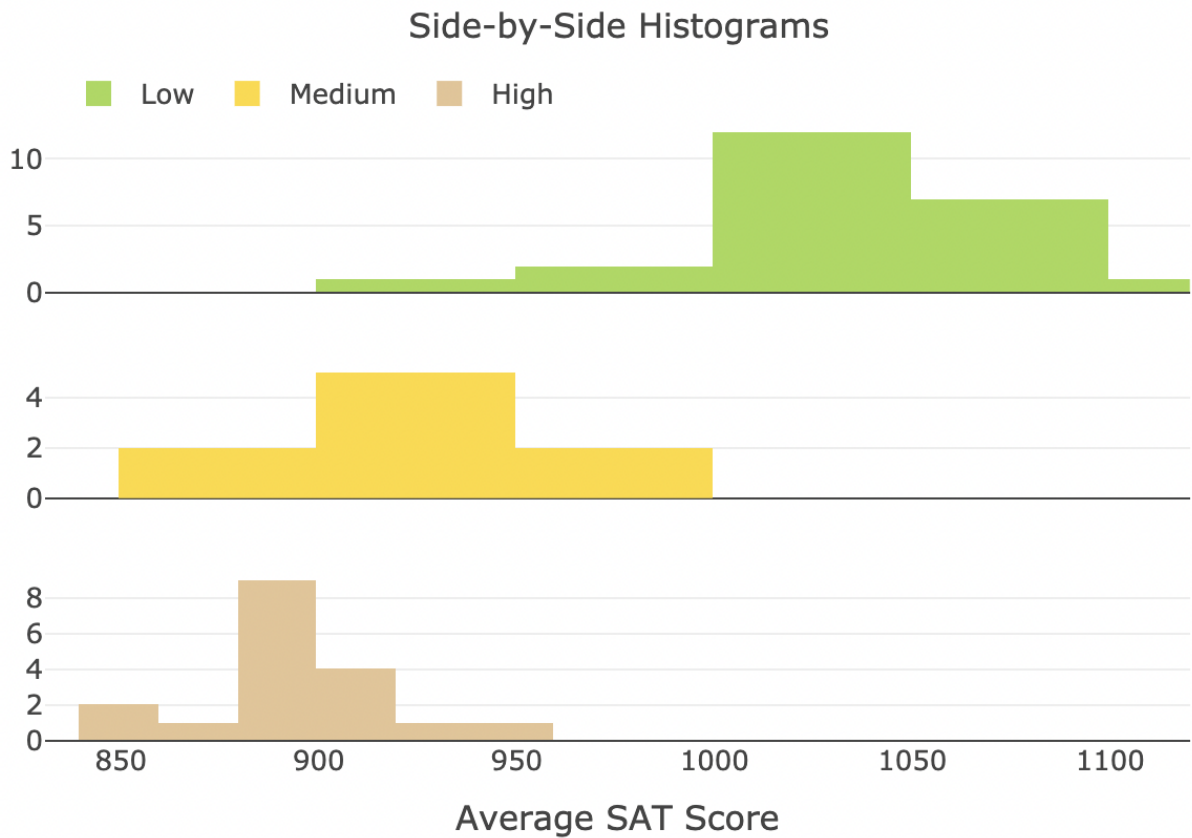


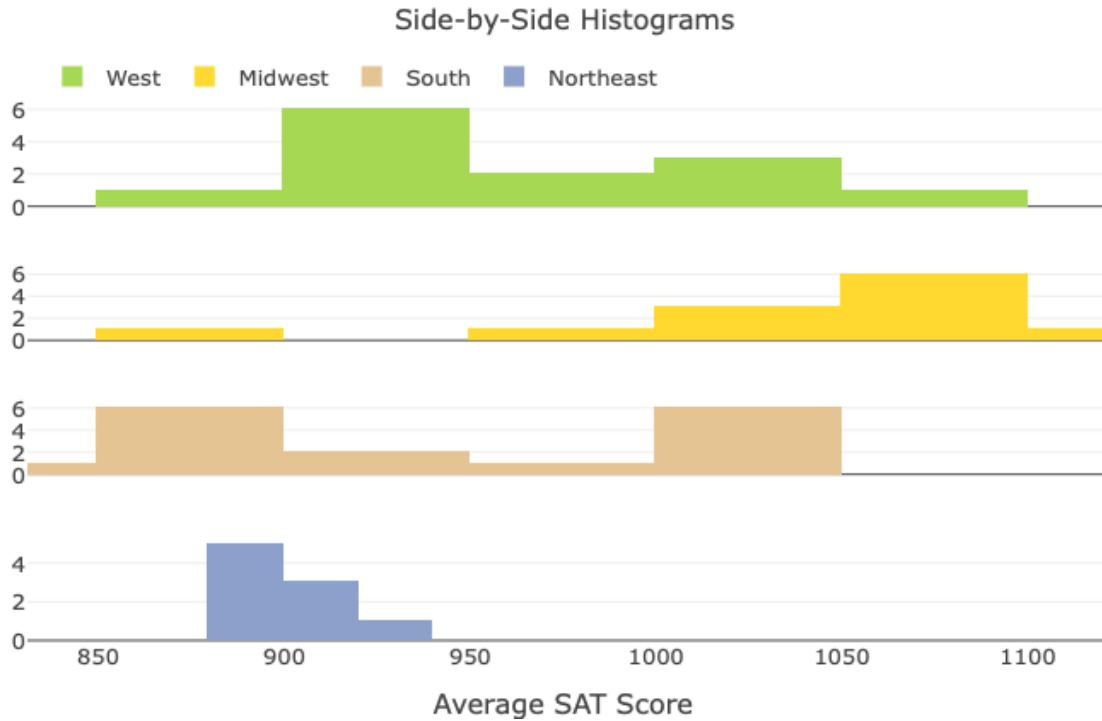
Practice Assignment: Measures of Variability

- 1) The following histograms display the average SAT scores for three different levels of participation: low, medium, and high. List the level of participation from the smallest standard deviation to the largest standard deviation in increasing order.



Answer: High, medium, low

- 2) Look at the four histograms that follow. They display the average SAT scores for four different regions around the United States. Which region has more variability, West or Northeast?



Answer: West

- 3) Go to the *Describing and Exploring Quantitative Variables* tool at https://lumen-learning.shinyapps.io/eda_quantitative/ to answer Parts A through C.

Part A: Select the **Several Groups** tab at top of the tool, locate the drop-down menu under “Dataset,” and select “SAT Scores by Region.”

Find the mean (\bar{x}), median, standard deviation (s) and variance (s^2) for the SAT average ratings for each region. Complete the following table.

Region	Mean \bar{x}	Median	Standard Deviation (s)	Variance (s^2)
West	964	947	52.5	2,756.25
Midwest	1,044	1,055	61.4	3,769.96
South	946	920	73.1	5,343.61
Northeast	901	898	15.7	246.49

Answer: Noted in red in the previous table.

Part B: In the tool, go to “Choose Type of Plot” and select “Histogram.”

Look at the histogram of the Northeast region and the standard deviation of the Northeast region. What aspect of the graph is described by the standard deviation of the region?

Answers will vary.

Sample answer: The variability or spread of the SAT scores; the smaller standard deviation means that the data are more clustered around the center.

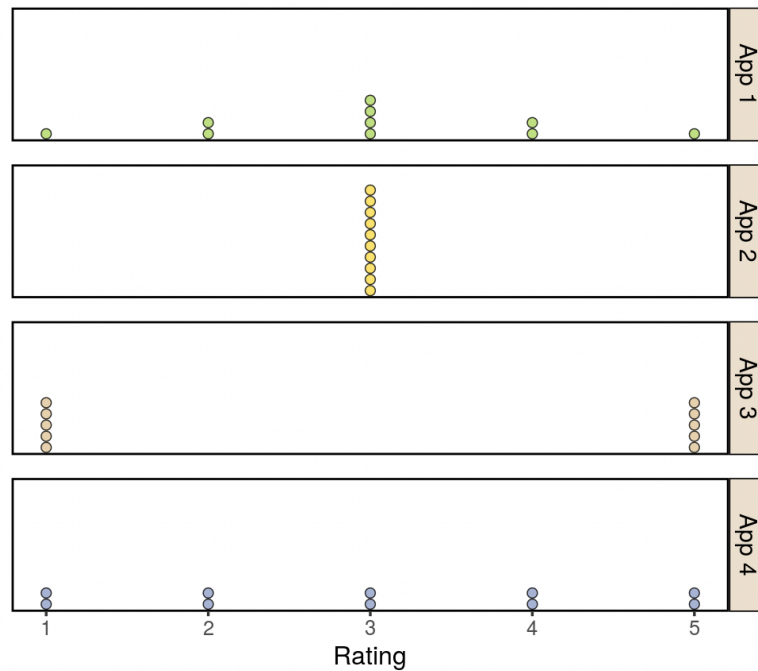
Part C: Compare the West region to the South region. Read the statement below and fill in the blanks with the appropriate answers.

The standard deviation for the West region is _____, and the standard deviation for the South region is _____. The mean and median for both regions are similar; however, the standard deviation for the West region is much _____. This means that there is _____ variability in the West region compared to the South region.

Answer: 52.5, 73.1, lower, less

- 4) The customer ratings for four different apps are shown in the following graph. Which app rating has a standard deviation of 0?

Side-by-Side Dotplots



Answer: App 2

- 5) Can the standard deviation of a dataset be a negative number? If so, provide an example. If not, explain why.

Answers will vary.

Sample answer: It is impossible for a dataset to have a negative standard deviation. Standard deviation is a measure of variability. Observations would have to have less than no variability in order for the standard deviation to be negative. Zero is the smallest possible value for standard deviation in any dataset.

- 6) Which of the following pieces of data have the same mean but different standard deviations? Choose all that apply.
- a) (10, 10, 10, 10, 10, 10)
 - b) (1, 1, 1, 15, 15, 15)
 - c) (0, 0, 0, 20, 20, 20)
 - d) (2, 6, 9, 10, 15, 18)

Answer: a, c, d