

## Worksheet 10/27/2023

**Range** = max value – min value

**Quartile:** lower quartile (1<sup>st</sup> quartile), median (2<sup>nd</sup> quartile), upper quartile (3<sup>rd</sup> quartile)

**Five-number summary** = min value, lower quartile, median, upper quartile, max value

$$\text{Standard deviation} = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n - 1}}$$

**Range rule of thumb:** standard deviation  $\approx$  range / 4

1) The table below gives the average sales tax rate (state plus local) in six east coast states and six western states as of 2021.

East coast states		Western states	
New York	8.52%	Washington	9.23%
Rhode Island	7.00%	California	8.68%
Massachusetts	6.25%	Arizona	8.40%
Florida	6.00%	Nevada	8.23%
Maryland	6.00%	Utah	7.19%
New Hampshire	0%	Oregon	0%

a) Find the mean, median, and range for each of the two data sets.

b) Give the five-number summary and draw a boxplot for each of the data sets.

c) Find the standard deviation for each of the data sets.

d) Apply the range rule of thumb to estimate the standard deviation of each of the data sets. How well does the rule work in each case? Briefly discuss why it does or does not work well.

e) Based on all your results, compare and discuss the two data sets in terms of their center and variation.

2) An auto transmission manufacturer receives ball bearings with a specified diameter of 16.30 millimeters from two different suppliers. The ball bearings can be used only if their actual diameters are within 0.1 millimeter of the specified size. Recent shipments from the two suppliers had ball bearings with the following diameters.

**Supplier A:** 16.25, 16.27, 16.29, 16.31, 16.34, 16.37, 16.41

**Supplier B:** 16.19, 16.22, 16.28, 16.34, 16.39, 16.42, 16.44

a) Find the mean and standard deviation of each data set.

b) Draw a boxplot for each data set. Also mark minimum and maximum acceptable sizes for the ball bearings on each boxplot.

c) What percentage of ball bearings from each supplier meet the specifications?