# 1.3 Describing Quantitative Data with Numbers

**Learning Targets**
1. Calculate measures of center (mean, median).
2. Calculate and interpret measure of spread (range, IQR, standard deviation).
3. Choose the most appropriate measure of center and spread in a given setting.
4. Identify outliers using the 1.5 X IQR rule.
5. Make and interpret boxplots of quantitative data.
6. Use appropriate graphs and numerical summaries to compare distributions of quantitative variables.

**Vocabulary:** mean, median, range, quartiles, interquartile range, five-number summary, standard deviation, spread, variance, boxplots.

Read 48–50

What is the difference between $\bar{x}$ and $\mu$?

What is a resistant measure? Is the mean a resistant measure of center?

Read 51–53

Is the median a resistant measure of center? Explain.

How does the shape of a distribution affect the relationship between the mean and the median?

When should mean or median be calculated for the measure of center?

Read 53–55

What is the range? Is it a resistant measure of spread? Explain.

What are quartiles? How do you find them?

What is the interquartile range (*IQR*)?  Is the *IQR* a resistant measure of spread?

***Example***: McDonald's Fish and Chicken Sandwiches
Here are data on the amount of fat (in grams) in 9 different McDonald's fish and chicken sandwiches.  Calculate the median and the *IQR*.

| Sandwich | Fat (g) |
|---|---|
| Filet-O-Fish® | 19 |
| McChicken® | 16 |
| Premium Crispy Chicken Classic Sandwich | 22 |
| Premium Crispy Chicken Club Sandwich | 33 |
| Premium Crispy Chicken Ranch Sandwich | 27 |
| Premium Grilled Chicken Classic Sandwich | 9 |
| Premium Grilled Chicken Club Sandwich | 20 |
| Premium Grilled Chicken Ranch Sandwich | 14 |
| Southern Style Crispy Chicken Sandwich | 19 |

Read 57–58

What is an outlier?  How do you identify them?  Are there outliers in the chicken/fish sandwich distribution?

Here is data for the amount of fat (in grams) for McDonald's beef sandwiches.  Are there any outliers in this distribution?

| Sandwich | Fat |
|---|---|
| Big Mac® | 29 |
| Cheeseburger | 12 |
| Daily Double | 24 |
| Double Cheeseburger | 23 |
| Double Quarter Pounder® with cheese | 43 |
| Hamburger | 9 |
| McDouble | 19 |
| McRib® | 26 |
| Quarter Pounder® Bacon and Cheese | 29 |
| Quarter Pounder® Bacon Habanero Ranch | 31 |
| Quarter Pounder® Deluxe | 27 |
| Quarter Pounder® with Cheese | 26 |

Read 56–58

What is the five-number summary?  How is it displayed?




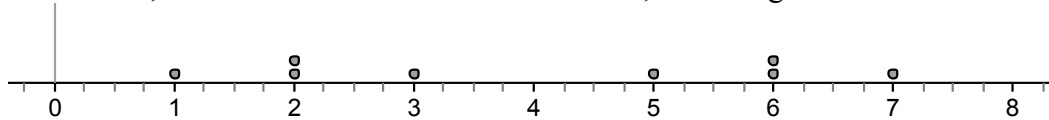Draw parallel boxplots for the beef and chicken/fish sandwich data.  Compare these distributions.



**TECHNOLOGY**:  TI 84 demonstration

**TRY**:  Check Your Understanding p. 59
**HW #15: page 47 (69–74), page 69 (79, 81, 83, 85, 86, 88, 89, 91, 93, 94a)**

# 1.3 Standard Deviation

In the distribution below, how far are the values from the mean, on average?

Collection 1



Data

What does the standard deviation measure?

What are some similarities and differences between the range, *IQR*, and standard deviation?

Read 60–62

How is the standard deviation calculated? What is the variance?

What are some properties of the standard deviation?

***Example***: A random sample of 5 students was asked how many minutes they spent doing HW the previous night. Here are their responses (in minutes): 0, 25, 30, 60, 90. Calculate and interpret the standard deviation.

TECHNOLOGY: TI 84 demonstration
Read 63–66
What factors should you consider when choosing summary statistics?

**HW #16: page 71 (97, 99, 101–105, 107-110)**