**2.5 Measures of Position**

Lesson Objectives:

1. Define and find quartiles (1st, 2nd, 3rd), and the IQR (interquartile range)
2. Graph and interpret box-and-whisker plots.
3. Define percentiles and interpret fractiles.
4. Find and interpret z-scores (standard scores).

**Fractiles:** Numbers that partition or divide an ordered data set into equal parts. The median is a fractile because it divides an ordered pair into two equal parts.

**Quartiles:** Q1,Q2,Q3, approximately divide an ordered data set into 4 equal parts. The second quartile is also known as the median.

**Interquartile Range (IQR):** Difference between the 1st and 3rd quartiles (Q3 – Q1)

**Outlier:** Any data value that lies more than 1.5 IQR’s to the left of Q1 or 1.5 IQR’s to the right on Q3.

**-How to find the 5 Number Summary of a Data Set, & box-and-whisker plot.**

Ex.1 – The test scores of 15 employees enrolled in a CPR training course are listed. Find the 5 number summary, construct a box-and-whisker plot for the data below. State any outliers.

13,9,18,15,14,21,7,10,11,20,5,18,37,16,17

*5 Number Summary:*

Q1 = \_\_\_\_, Q2 = \_\_\_\_\_, Q3 = \_\_\_\_\_, Lower extreme=\_\_\_\_\_, Upper extreme\_\_\_\_\_

Interquartile Range (IQR) = \_\_\_\_\_\_\_\_\_ Outliers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Steps:

Ex.2 – The tuition costs (in thousands of dollars) for 25 universities are listed. Find the 5 number summary and construct a box-and-whisker plot for the data below. State any outliers. What can you conclude?

20 26 28 25 31 14 23 15 12 26 29 24 31

19 31 17 15 17 20 31 32 16 21 22 28

*5 Number Summary:*

Q1 = \_\_\_\_, Q2 = \_\_\_\_\_, Q3 = \_\_\_\_\_, Lower extreme=\_\_\_\_\_, Upper extreme\_\_\_\_\_

Interquartile Range (IQR) = \_\_\_\_\_\_\_\_\_ Outliers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Draw a box-and-whisker plot for the following data:

 4 7 7 5 2 9 7 6 8 5 8 4 1 5 2 8 7 6 6 9

4.A student’s score on an ACT placement test for college algebra is in the 63rd percentile. What can you conclude about the student’s test score?

1. True or False. The five number summary needed to graph the box-and-whisker plot are the minimum, the maximum, Q1,Q3, and the mean.