

Agenda for Monday, Sep 23rd 2024	
Section 3.3 Measures of Position	1

Coming up

- ! HW 8 will be posted this evening
- Second **Excel Homework** will be posted Wednesday

Section 3.3 Measures of position

The standard deviation is useful when comparing data values that come from different data sets. If the data sets have different means and standard deviations, then comparing the data values directly can be misleading.

Let x be a data value. A **z-score** corresponding to x

Example 1. The average test score for Mr. Jone's class is 124 with a standard deviation of 16. The average test score for Ms. Siegel's class is 72 with a standard deviation of 8. Tina and Melanie were comparing themselves to see who did better on their prospective exams. Tina scored a 118 in Mr. Jone's exam while Melanie scored a 67 on Ms. Siegel's exam. Find the z-scores and compare.

Practice: Two swimmers, Angie and Beth, from different teams, wanted to find out who had the fastest time for the 50 meter freestyle when compared to her team. The table below shows their times.

Swimmer	Time in Seconds	Team Mean Time	Team Standard Deviation
Angie	26.2	27.2	0.8
Beth	27.3	30.1	1.4

Which swimmer had the fastest time when compared to her team?

Empirical Rule

For data having a distribution that is bell-shaped and symmetric:

- 68% of the data lies within **one** standard deviation of the mean
- 95% of the data lies within **two** standard deviation of the mean
- 99.7% of the data lies within **three** standard deviation of the mean

Visual of Empirical Rule, use mean = 40 and standard deviation = 3

Example 2. The average height of adult men in the US is 68 inches with a standard deviation of 2.5 inches. Using Empirical Rule

1. Find the heights of the middle 68% of adult men.

2. What percentage of men is taller than 73 inches?

3. What percentage of men shorter than 75.5 inches?

4. What is your height if your z-score is 2.5?

Measures of relative position are used to describe data values relative to other data values.

Quartiles

Example 3. Consider the following data set.

1; 1; 2; 2; 4; 6; 6.8; 7.2; 8; 8.3; 9; 10; 10; 11.5

Five number summary

Example 4. Listed the ages of the 46 US Presidents when entered office in order from smallest to largest.

42; 43; 46; 46; 47; 47; 48; 49; 49; 50; 51; 51; 51; 51; 51; 52; 52; 54; 54; 54; 54;
54; 55; 55; 55; 55; 56; 56; 56; 57; 57; 57; 57; 58; 60; 61; 61; 61; 62; 64; 64; 65;
68; 69; 70; 78

Boxplot

InterQuartileRange(IQR)

Outlier

Example 5. Use age of presidents example to determine if there are any outliers.