



Math Virtual Learning

Algebra IIB

The Data Unit - What is Normal?

May 6, 2020



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Lesson: May 6, 2020

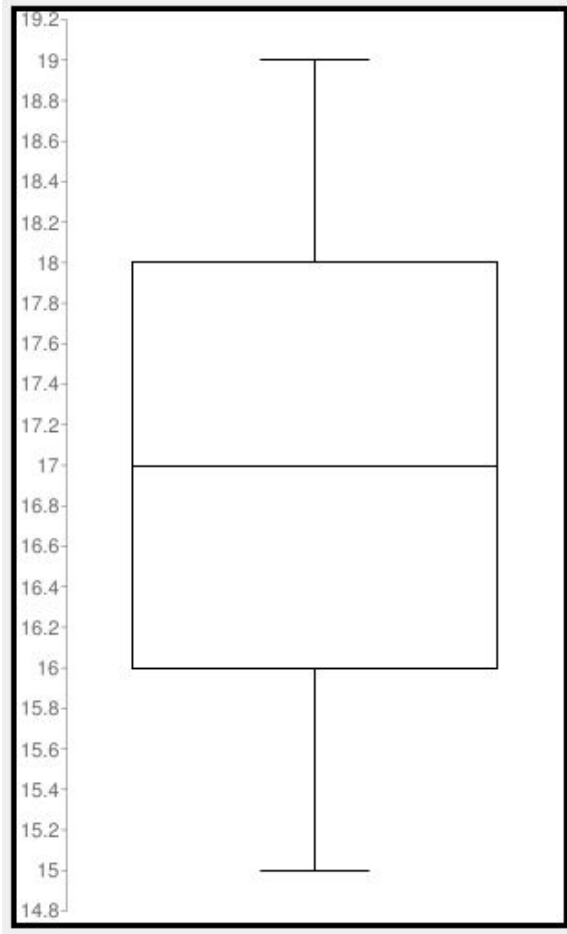
Objective/Learning Target: Students will be determine if a data set is normal

Let's Get Started:

Review: The age that people get their first driver's license are listed. Compute the mean and the standard deviation for the following data set. Create a box plot for the data.

18, 18, 16, 18, 16, 16, 19, 18, 16, 16, 17, 17, 16, 18,
17, 17, 16, 18, 19, 17, 17, 16, 16, 15

Let's Get Started Answers:



The mean is 16.95

The standard deviation is 1.06

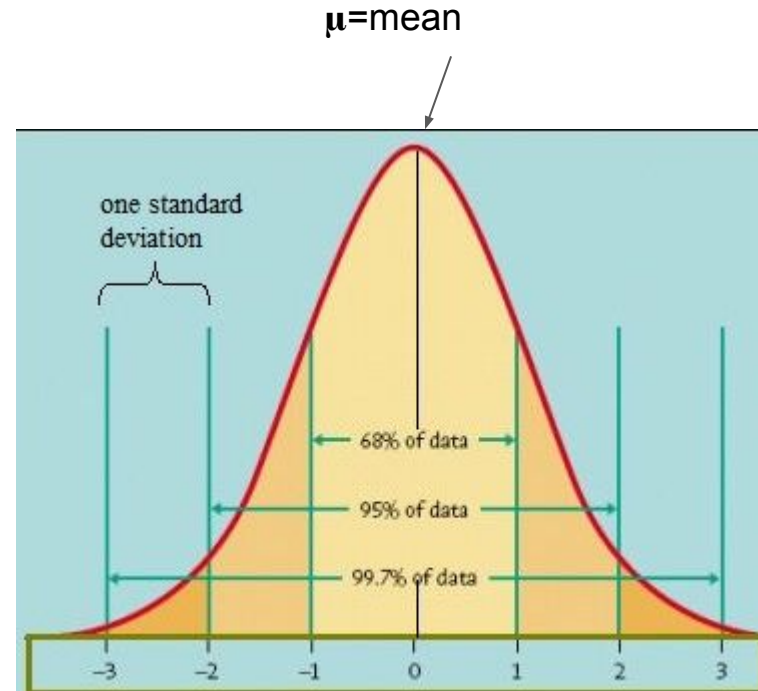
The graph looks fairly symmetrical. If we know the mean and the standard deviation we can construct what is called a **NORMAL CURVE** which lets us determine if any particular point in the data set can be considered "Normal". For instance, would it be considered normal to get your first driver's license at 18? What about 20?

The Normal Curve

On a normal curve 50% of the data falls to the left of the mean and 50% of the data falls to the right of the mean which is why it looks so symmetrical.

A small percentage of the points are on both tails and the bigger percentage of the points are on the inner part of the curve. In the **standard normal model**, about 5 percent of your data would fall into the “tails” (colored darker orange) and 95 percent will be in between. For example, for driver’s licenses, the normal distribution would show 2.5 percent of people getting *them at a very young age* and 2.5 percent getting *them much older*. The rest will be in the middle; not too high or too low.

The green lines on the graph show the number of standard deviations away from the mean. Between -2 and 2 is considered “Normal” because 95% of all the data should fall between those 2 numbers.



To Draw a Normal Curve

Step 1: Draw the curve

Step 2: Draw a line down the middle and label it with the mean **Mean = 29.44**

Step 3: Add 3 red lines to each side of the curve.

Step 4: Add the standard deviation to the mean and label the 1st red line. Repeat for the next 2 lines **$\mu = 4.85$**

$$29.44 + 4.85 = 34.29$$

$$34.29 + 4.85 = 39.14$$

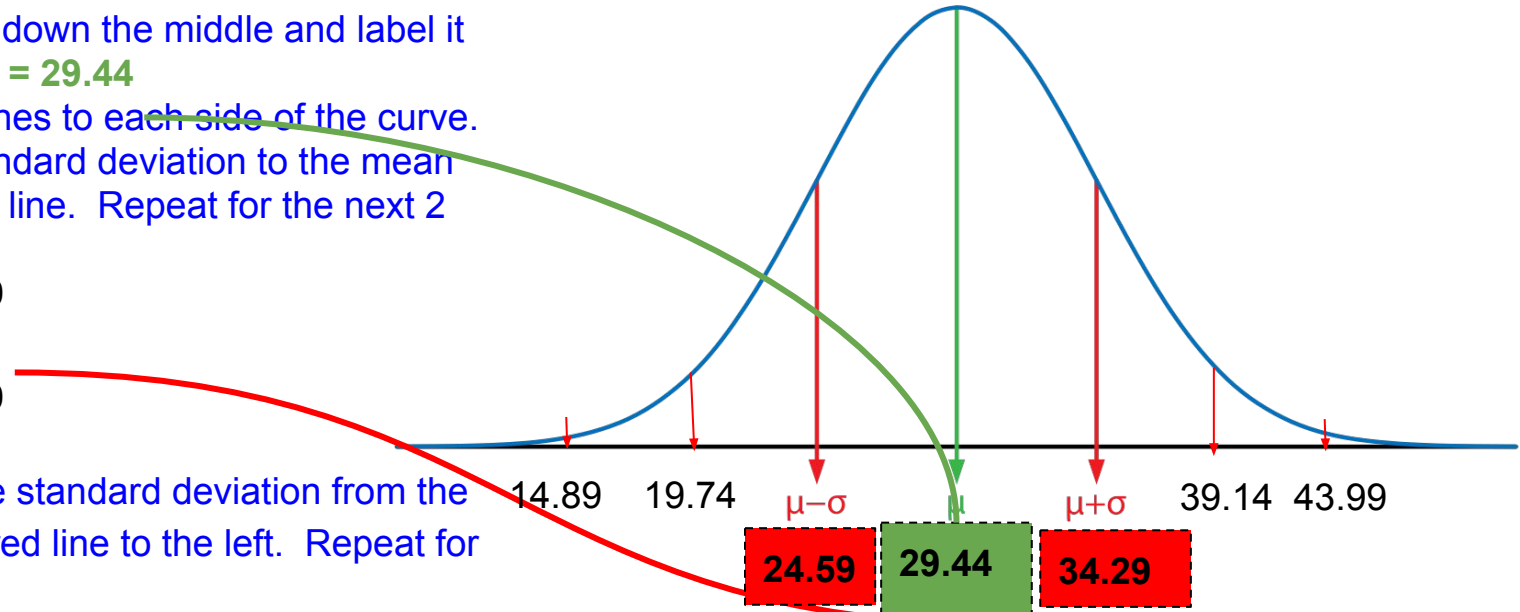
$$39.14 + 4.85 = 43.99$$

Step 5: Subtract the standard deviation from the mean and label the red line to the left. Repeat for the next 2 lines.

$$29.44 - 4.85 = 24.59$$

$$24.59 - 4.85 = 19.74$$

$$19.74 - 4.85 = 14.89$$



Today you will be trying some on your own...

The following 4 slides each contain 1 scenario with data. For each slide:

- Calculate the Mean
- Calculate the Standard Deviation
- Calculate the Range of 1 Stand Dev on each side of the Mean
- Determine if the data is Normal or Not
- Describe the Mean and the Sample Standard Deviation in words

Use the [Statistics Calculator](#) for the mean and standard deviation

The data set below gives the prices (in dollars) of bluetooth speakers at an electronics store:

\$35, \$50, \$60, \$60, \$75, \$65, \$80

- 1. Calculate the Mean**
- 2. Calculate the Standard Deviation**
- 3. Calculate the Range of 1 Stand Dev on each side of the Mean**
- 4. Determine if the data is Normal or Not**
- 5. Describe the Mean and the Sample Standard Deviation in words**

The data set below gives the prices (in dollars) of bluetooth speakers at an electronics store:

\$35, \$50, \$60, \$60, \$75, \$65, \$80

1. Calculate the Mean **60.71**
2. Calculate the Standard Deviation **15.12**
3. Calculate the Range of 1 Stand Dev on each side of the Mean **45.59 - 75.83**
4. Determine if the data is Normal or Not **5 out of 7 numbers are in my range so $5 \div 7 \approx .71 = 71\%$ so YES the data is approximately normal.**
5. Describe the Mean and the Sample Standard Deviation in words **The average cost of a bluetooth speaker at this store is \$60.71. The majority of the prices, 71%, is within \$15.12 on either side (above or below) the avg.**

The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season: **51, 48, 47, 46, 45, 43, 41, 40, 40, 39**

- 1. Calculate the Mean**
- 2. Calculate the Standard Deviation**
- 3. Calculate the Range of 1 Stand Dev on each side of the Mean**
- 4. Determine if the data is Normal or Not**
- 5. Describe the Mean and the Sample Standard Deviation in words**

The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season: **51, 48, 47, 46, 45, 43, 41, 40, 40, 39**

1. Calculate the Mean **44**
2. Calculate the Sample Deviation **4.03**
3. Calculate the Range of 1 Stand Dev on each side of the Mean **39.97 - 48.03**
4. Determine if the data is Normal or Not **8 out of 10 numbers are in my range so $8 \div 10 \approx .80 = 80\%$ so YES the data is approximately normal.**
5. Describe the Mean and the Sample Standard Deviation in words **The average number of home runs for these 10 batters is 44. The majority of the home runs, 80%, are within 4 home runs on either either side (above or below) the avg**

The data set below gives the waiting times (in minutes) of several people at a local hospital's emergency room:

11, 7, 14, 2, 8, 13, 3, 6, 10, 3, 8, 4, 8, 4, 7

- 1. Calculate the Mean**
- 2. Calculate the Sample Deviation**
- 3. Calculate the Range of 1 Stand Dev on each side of the Mean**
- 4. Determine if the data is Normal or Not**
- 5. Describe the Mean and the Sample Standard Deviation in words**

The data set below gives the waiting times (in minutes) of several people at a local hospital's emergency room:

11, 7, 14, 2, 8, 13, 3, 6, 10, 3, 8, 4, 8, 4, 7

1. Calculate the Mean **7.2**
2. Calculate the Sample Deviation **3.67**
3. Calculate the Range of 1 Stand Dev on each side of the Mean **3.53 - 10.87**
4. Determine if the data is Normal or Not **9 out of 15 numbers are in my range so $9 \div 15 \approx .60 = 60\%$ so NO the data is NOT approximately normal.**
5. Describe the Mean and the Sample Standard Deviation in words **The average wait time at this hospital ER is 7.2 minutes. The wait time for 60% of the people falls between 3.53 - 10.87 minutes.**

The data set below gives the calories in a 1-ounce serving of several breakfast cereals:

135, 115, 120, 110, 110, 100, 105, 110, 125

- 1. Calculate the Mean**
- 2. Calculate the Sample Deviation**
- 3. Calculate the Range of 1 Stand Dev on each side of the Mean**
- 4. Determine if the data is Normal or Not**
- 5. Describe the Mean and the Sample Standard Deviation in words**

The data set below gives the calories in a 1-ounce serving of several breakfast cereals:

135, 115, 120, 110, 110, 100, 105, 110, 125

1. Calculate the Mean **114.44**
2. Calculate the Standard Deviation **10.74**
3. Calculate the Range of 1 Stand Dev on each side of the Mean **103.7 - 125.18**
4. Determine if the data is Normal or Not **7 out of 9 numbers are in my range so $7 \div 9 \approx .77 = 77\%$ so YES the data is approximately normal.**
5. Describe the Mean and the Sample Standard Deviation in words **The average number of calories in a 1-ounce serving of these cereal brands is 114.44. The calories of these brands are within 10.74 calories of the average, either above or below.**