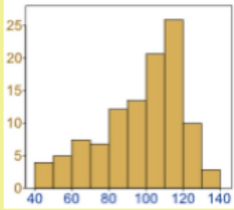


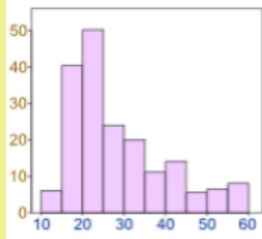
Interpreting Graphs

Data can be spread out in many different ways.

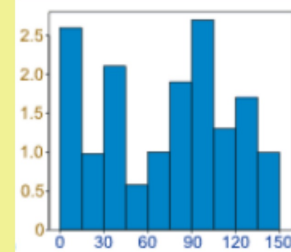
It can be spread out on the left



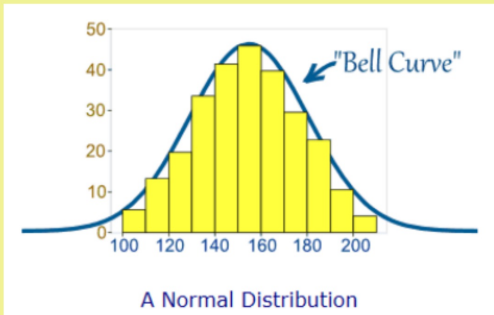
It can be spread out on the right



Or it can be all jumbled up.

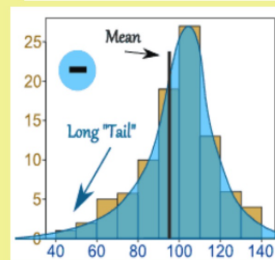
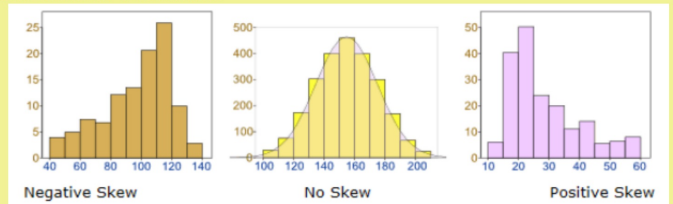


But there are many cases where the data tends to be around a central value with no bias right or left, and it gets close to a "Normal Distribution" like this:



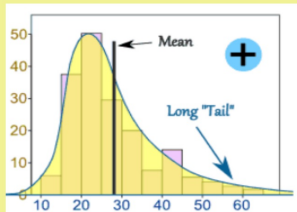
It is often called a "Bell Curve" because it looks like a bell.

Data can be "skewed", meaning it tends to have a long tail on one side or the other.

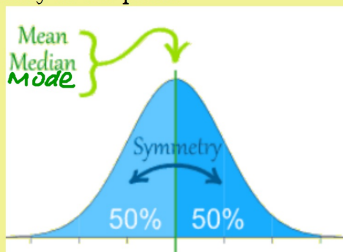


Why is it called "negative skew"? Because the long "tail" is on the negative side of the peak. People sometimes say it is "skewed to the left". The mean is also to the left of the peak.

"Positive skew" is when the "tail" is on the right; people also call this "skewed to the right". The mean is to the right side of the peak value.



Normal distribution has no skew. It is perfectly symmetrical. The mean is exactly at the peak.



To determine skewness

$$\frac{\# \text{ of data points below mean} - \# \text{ of data points above mean}}{\# \text{ of data points}}$$

Ex. 2, 3, 5, 8, 10, 10, 12

$$\bar{X} = 7.14 \text{ so } \frac{3-4}{7} = -.14$$

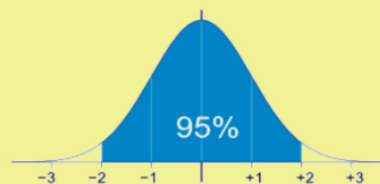
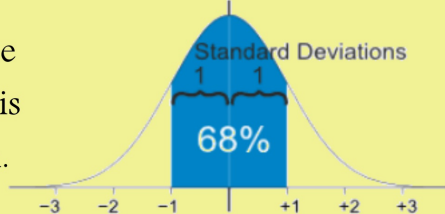
This means skew is $-.14$ so negative skew or to the left.

Mean is to left of median.

Standard Deviations:

The Standard Deviation is a measure of how spread out the numbers are. When you calculate the standard deviation of your data, you will generally find that 68% of values are within 1 standard deviation of the mean.

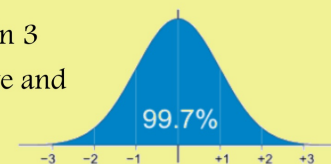
34% is above the mean and 34% is below the mean.



95% of the values are within 2 standard deviations of the mean.

47.5% is above the mean, and 47.5% is below the mean

99.7% of the values fall within 3 SD of the mean. 49.85% above and 49.85% below.



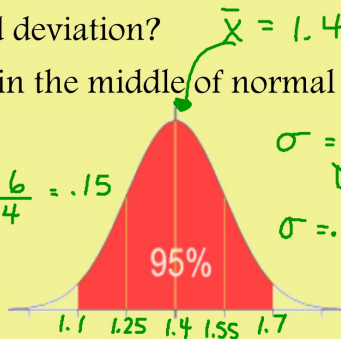
Example: 95% of students at school are between 1.1 and 1.7 m tall. Assuming this data is normally distributed, can you calculate the mean and standard deviation?

The mean is in the middle of normal distribution

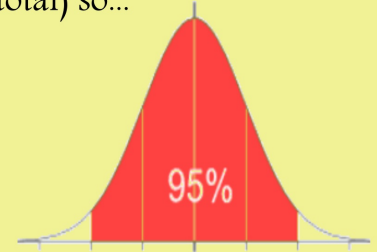
so...

$$\frac{1.7 - 1.1}{4} = \frac{.6}{4} = .15$$

σ = Standard Deviation
 $\sigma = .15$



95% is 2 standard deviations to either side of the mean, (that's 4 total) so...



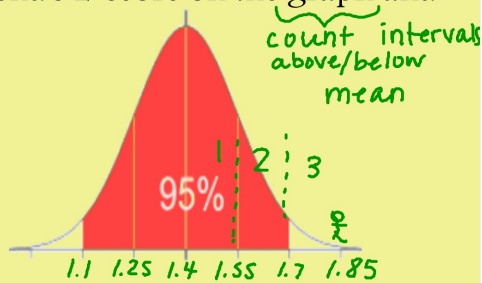
The number of standard deviations from the mean is also called the "Standard Score", "sigma (σ)", or "z-score".

In that same school, one of your friends is 1.85 m tall. Find your friend's z-score on the graph and algebraically.

$$z = \frac{x - \bar{x}}{\sigma}$$

$$z = \frac{1.85 - 1.4}{.15}$$

$$z = 3$$



Homework:

Worksheets
Interpreting Graphs
Introduction to Standard Deviation