How to Use Standard Deviation

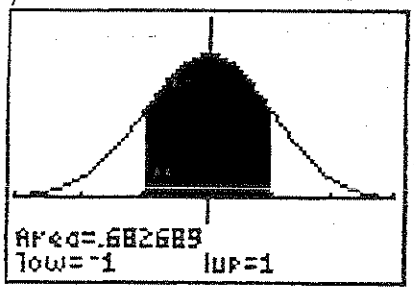
Besides being able to compare two data sets to see which one has more variability, you can use standard deviation other ways, too.

Many populations (complete data sets) have a *normal* distribution. A dotplot of the data is bell-shaped. Some things that are normally distributed are: heights of male (and female) adults, most standardized test scores, IQ scores, and many other things.

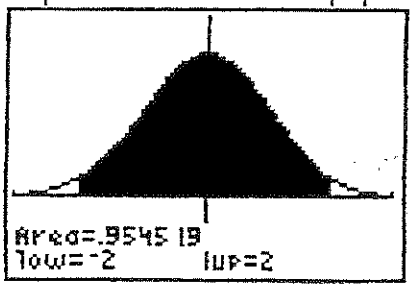
If you only have a sample from a population, how do you know if the population is normally distributed? There are sophisticated computerized tests that you can do on the sample, but also, many people who do a lot of data analysis know the kinds of populations they are working with. There are many other kinds of distributions that statisticians are familiar with.

A lot is known about the normal distribution. An important fact is the **68-95-99.7 Rule.**

If all the data from a normal population is plotted, and if you draw lines one standard deviation above and below the mean, and shade the area between, you will have shaded **68%** of the population or the area under the curve.

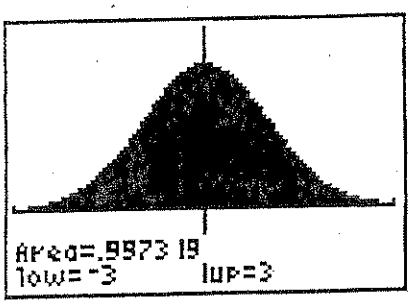


If you draw lines 2 standard deviations above and below the mean, you capture **95 %** of the population, or the area under the curve.



Transparency

If you draw lines 3 standard deviations above and below the mean, you capture 99.7 % of the population, or the area under the curve.



There are charts that give more detailed information about the normal distribution, but even knowing only the 68-95-99.7 rule, you can answer questions like these:

1. On a normally distributed standardized test, what per cent of the people have a score which is within one standard deviation of the mean?

2. What percent would have a score that is one standard deviation or less above the mean?

3. What is the probability of getting a score that is one or more standard deviations above the mean?

4. What is the probability of getting a score that is 3 standard deviations above the mean on a test whose scores are normally distributed? How many people in a group of 10,000 are likely to score above the third standard deviation?

5. Jane took two different standardized tests. On the verbal test, she got a score of 450 which was 2 standard deviations above the mean. On the math test, she got a score of 600 which was 1.5 standard deviations above the mean. For which test did she do better in comparison to the rest of the testing group?

NORMAL DISTRIBUTION CURVE