Statistical Reasoning
Normal Distribution

Name: Date: Class:

The Normal Distribution and the Standard Deviation

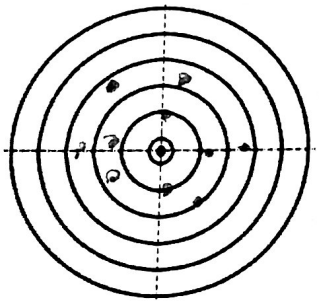
Normal Distribution: A probability distribution modeled by a bell shaped curve (also called a normal curve) that is symmetric about the mean.

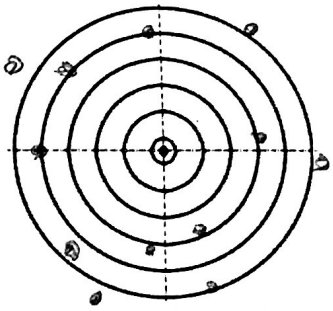
The standard deviation is a measure of how far each value is from $\bar{x}$.

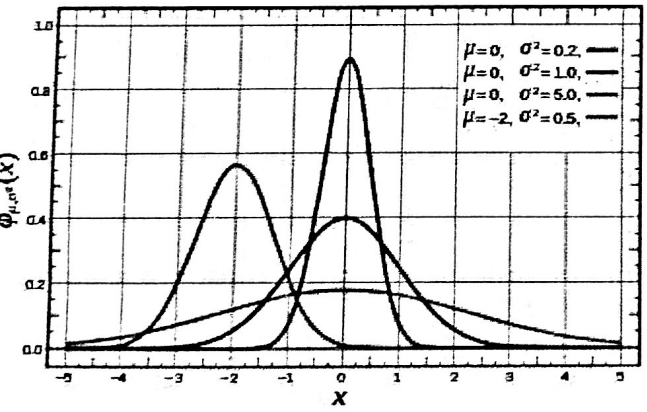
The symbol for the population standard deviation is σ (the Greek letter sigma).

small standard deviation

large standard deviation





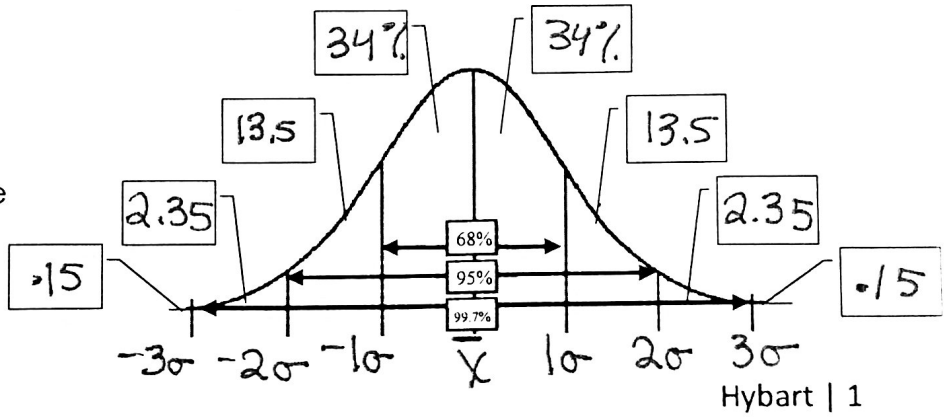


In a normal distribution, the larger the standard deviation, the "flatter" the distribution, as shown in this picture.

As the standard deviation decreases, the values in the distribution are clustered more closely around the mean, so the distribution appears "taller."

The Empirical Rule

Knowing that the values in a set are approximately normally distributed allows you to get a feel for how scarce or common a particular value might be in that set.



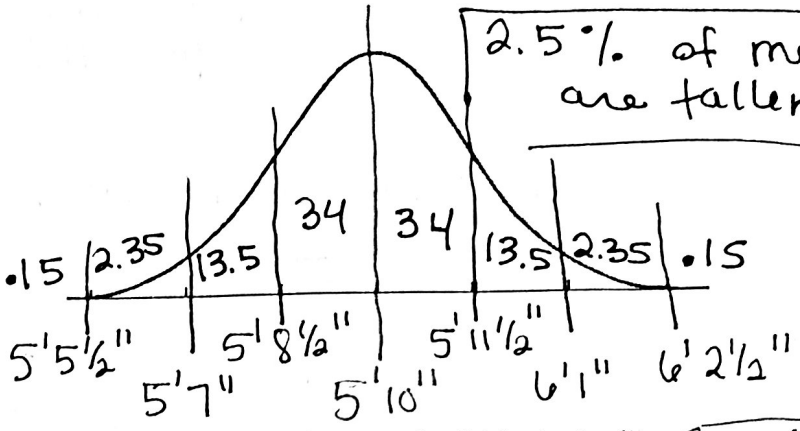
Examples

1. Human height is commonly considered an approximately normally distributed measure. If the mean height of a male adult in the U.S.A. is 5'10", with a standard deviation of 1.5", how common are men with heights greater than ~~6'2"~~ 6'1"?

$\bar{x} = 5'10"$ $\sigma = 1.5"$

$2.35\% + .15\% = 2.5\%$

2.5% of men are taller than 6'1".



2. If the fuel mileage of a particular model of car is normally distributed, with a mean of 26 mpg and a standard deviation of 2 mpg, how common are cars with a fuel efficiency of 24 to ~~25~~ 28 mpg?

$\bar{x} = 26$ mpg
$\sigma = 2$ mpg

68% of cars have fuel efficiency of 24 to 28 mpg.