Scenario 2: Unfortunately the cost of fluff needed to manufacture the Fluffy Bunny suits is increasing, thus the company is losing money. The company decides to cut everyone's original pay by $500. What happens to the mean and standard deviation?

$\bar{x}$ = 891.7 s = 488.9

In general, what happens to the mean and standard deviation if a number is added (or subtracted) to each data value?

$\bar{X}$ increases (or decreases) by that number

S stays the same

Scenario 3: The company profits are stable, so we give everyone a 30% raise. What will happen to the mean and standard deviation?

$\bar{x}$ = 1809.2 s = 635.6

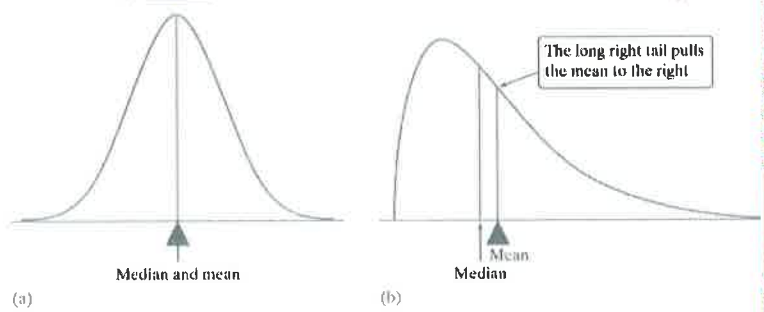
In general, what happens to the mean and standard deviation if each data value is multiplied by a number?

$\bar{X}$ is multiplied by that number

S is multiplied by that number

Density Curve: a curve that has area exactly 1 underneath it.

Symmetric distribution: mean = median
Skewed Right distribution: mean > median
Skewed Left distribution: mean < median

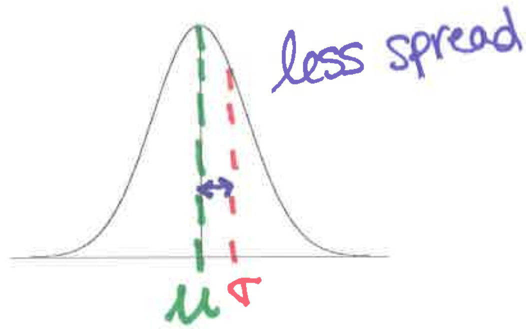


The Normal Distribution

The Mean and Stand. Dev. can be combined to obtain informative statements about how the values in a data set are distributed and about the relative position of a particular value in a data set. To do this, it is useful to be able to describe how far away a particular observation is from the mean in terms of the standard deviation.

One particularly important class of density curves are the Normal **curves**, which describe **Normal distributions**.

- All Normal curves are <u>Symmetric</u>, single-peaked, and bell-shaped
- A Specific Normal curve is described by giving its mean <u>μ</u> and standard deviation <u>σ</u>.

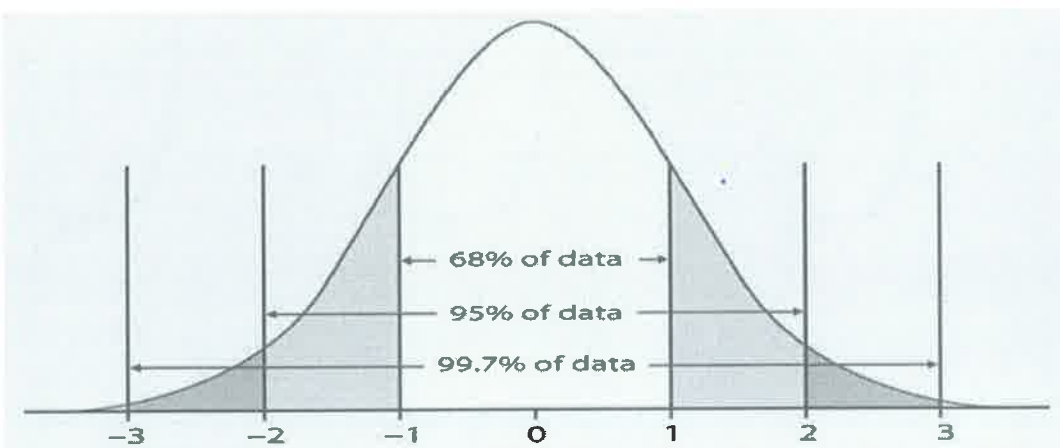


From Calculus

Pts of Inflection

- The mean of a Normal distribution is the center of the symmetric **Normal curve.**
- The standard deviation is the <u>distance</u> from the center to the change-of-curvature points on either side.
- We can abbreviate the Normal distribution with mean μ and standard deviation σ as <u>$N(\mu,\sigma)$</u>.

The 68-95-99.7 Rule ("The Empirical Rule")



EXAMPLE 1: The distribution of heights of adult American men is approximately normally distributed with mean 69 inches and standard deviation 2.5 inches. Sketch the corresponding normal curve.

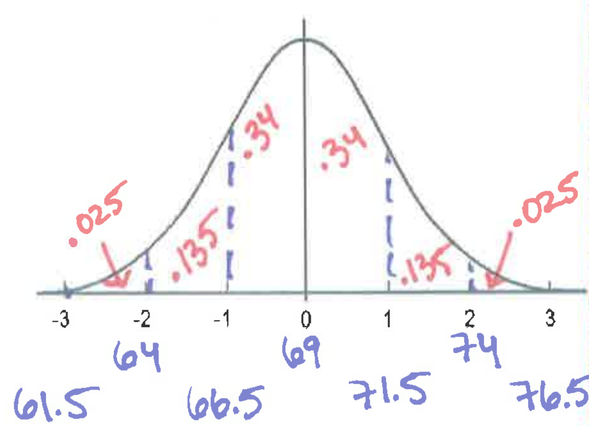
a. What percent of men are taller than 74 inches?

2.5%

b. Between what heights do the middle 95% of men fall?

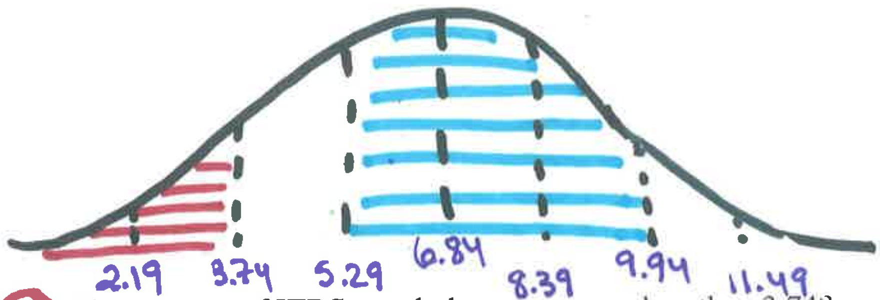
64 and 74 inches

c. What percent of men are between 64 and 66.5 inches tall? 13.5%



EXAMPLE 2: The distribution of Iowa Test of Basic Skills (ITBS) vocabulary scores for 7th grade students in Gary, Indiana, is close to Normal. Suppose the distribution is $N(6.84, 1.55)$.

a) Sketch the Normal density curve for this distribution.



b) What percent of ITBS vocabulary scores are less than 3.74?

2.5%

c) What percent of the scores are between 5.29 and 9.94?

81.5%

Standard Normal Distribution

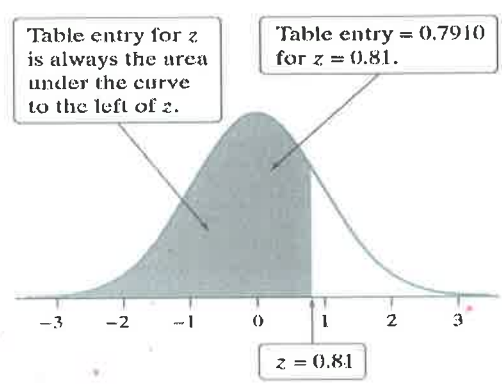
- Normal distribution with mean 0 and standard deviation 1.

❖ **The Standard Normal Table**: Because all Normal distributions are the same when we standardize, we can find areas under any Normal curve from a single table.

Table A is a table of areas under the standard Normal curve. The table entry for each value z is the Area under the curve to the left of z.

EXAMPLE 1:

a. Suppose we want to find the proportion of observations from the standard Normal distribution that are less than 0.81. .7910



b. What is $P(z < -2.0)$? .0228

c. What is $P(z < 2.0)$? .9772

d. Find $P(z < 0.46)$. .6772

e. Find $P(z < -2.74)$. .0031

f. Find the proportion of observations from the standard Normal distribution that are between -1.25 and 0.81.

$.7910 - .1056 = .6854$