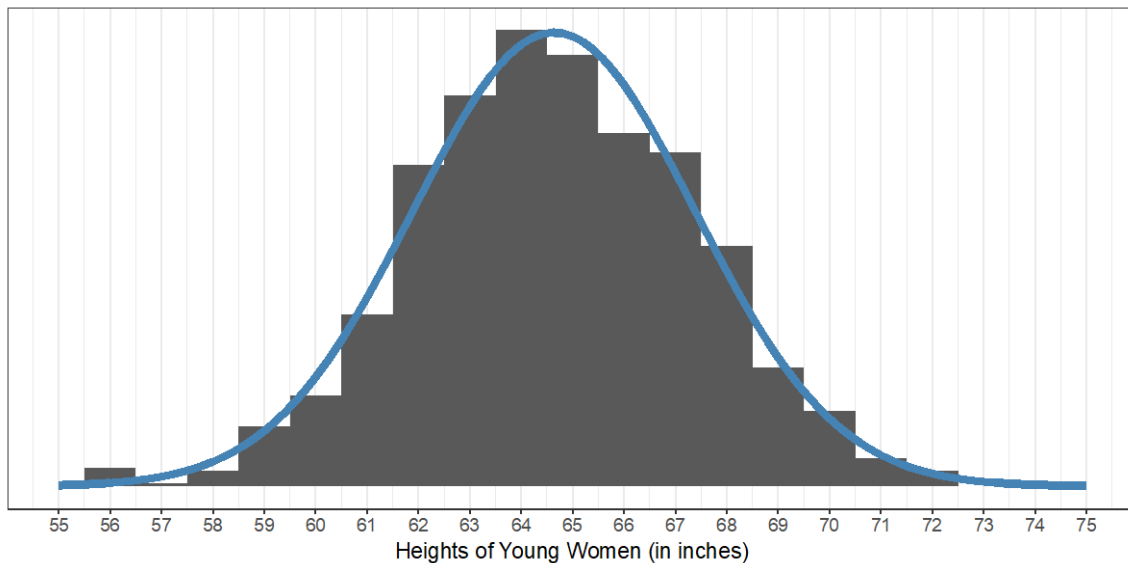


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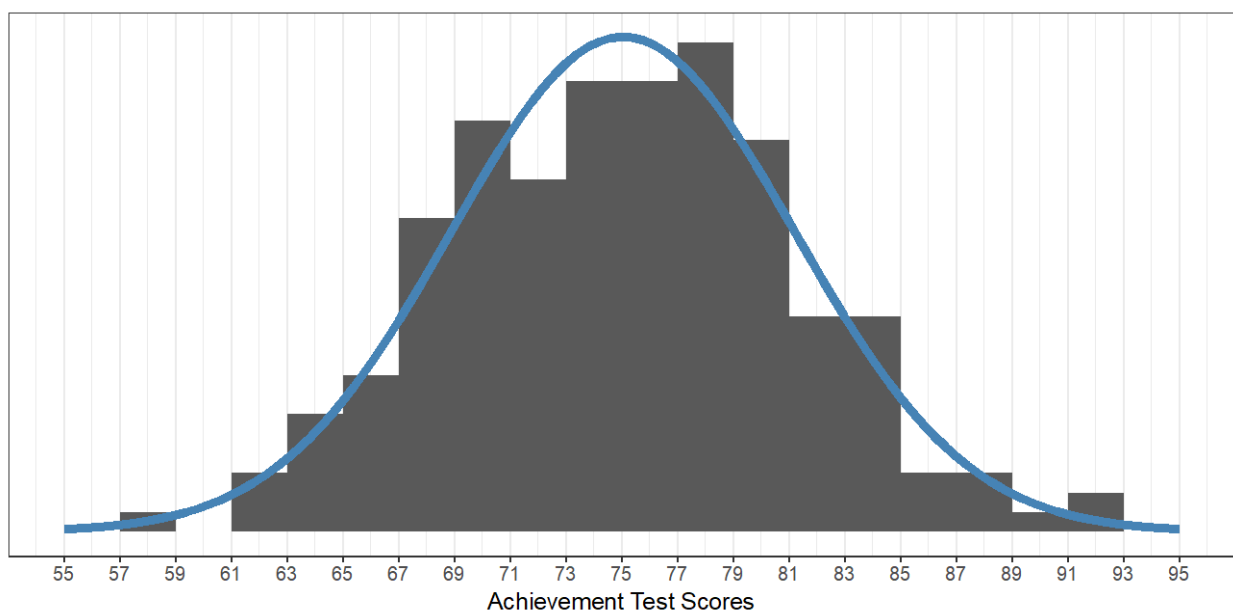
Investigation 14: How Long Do the Subway Doors Stay Open?

Worksheet 4.1 Normal Distribution

The example below is a distribution of women's heights. The distribution is mound shaped and somewhat symmetric with a mean of 64.6 inches and a standard deviation of 2.75 inches.



Another example shows the achievement scores for 200 students at a high school. The distribution is mound shaped and somewhat symmetric with a mean of 75.7 and a standard deviation of 6.1.



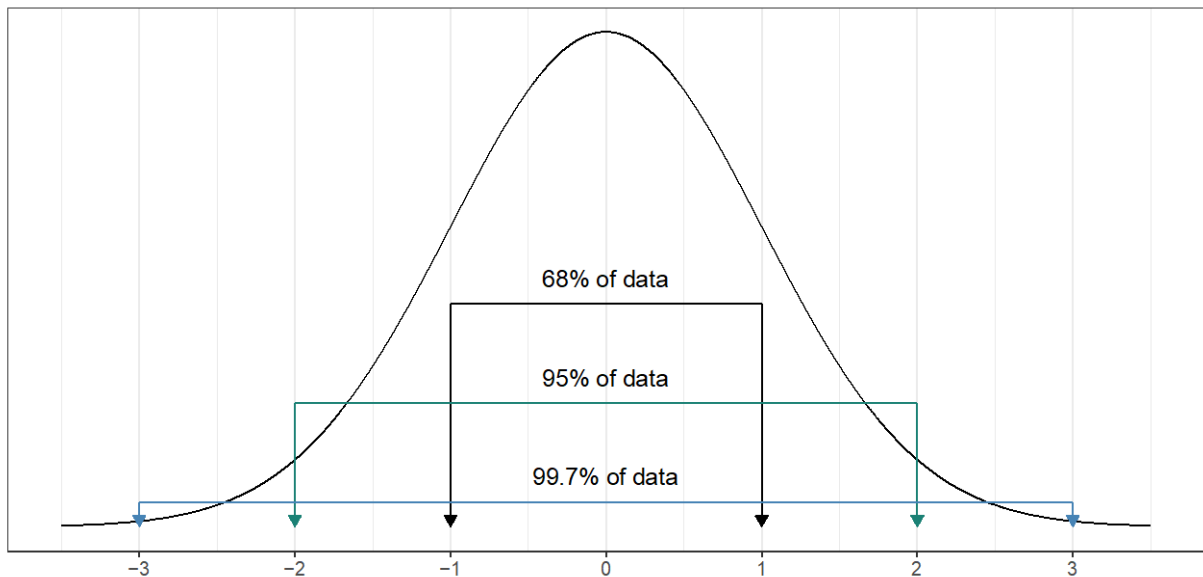
We might say that the two distributions are approximately Normal. The smooth curve drawn on the histograms is called a Normal curve.

Each Normal curve is unique based on the mean and standard deviation but all are symmetric and have the same properties.

One important property of all Normal curves is the proportions of data within one and two standard deviations of the mean are the same and these proportions form the **Empirical Rule**.

The **Empirical Rule** states that for a Normal distribution, nearly all the data will fall within three standard deviations of the mean. The Empirical Rule can be broken down into three parts:

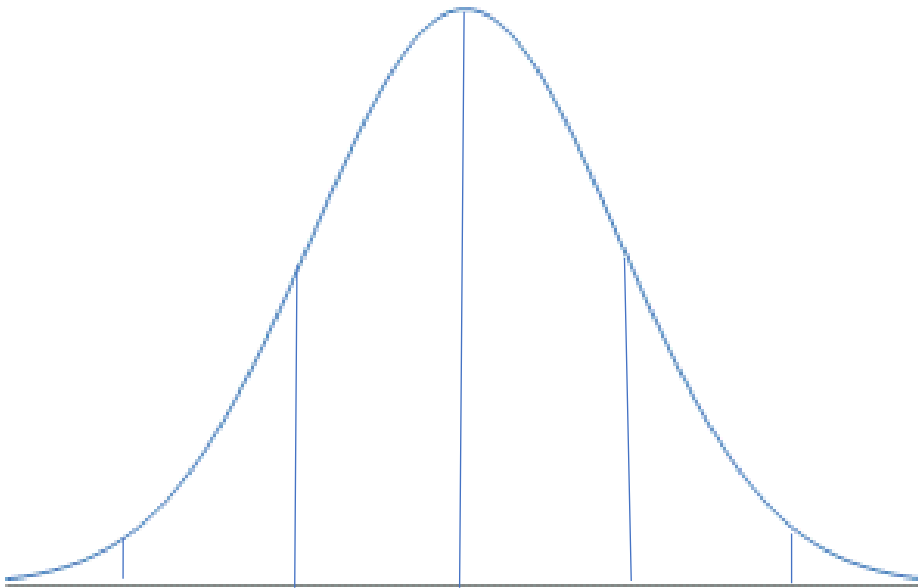
- Approximately 68% of data falls within one standard deviation of the mean.
- Approximately 95% of data falls within two standard deviations of the mean.
- Approximately 99.7% of data falls within three standard deviations of the mean.



Using the Empirical Rule

Suppose a certain life of brand of light bulbs can be modeled with the Normal distribution with a mean of 1050 hours and a standard deviation of 95 hours.

1. On the Normal curve below, add the mean and the values one and two standard deviations from the mean.



2. What proportion of bulbs last between 955 and 1145 hours?
3. What proportion of bulbs last between 860 and 1240 hours?
4. What proportion of bulbs last less than 860 hours?
5. What proportion of bulbs last between 955 and 1050 hours?
6. What proportion of bulbs last between 1145 and 1240 hours?

