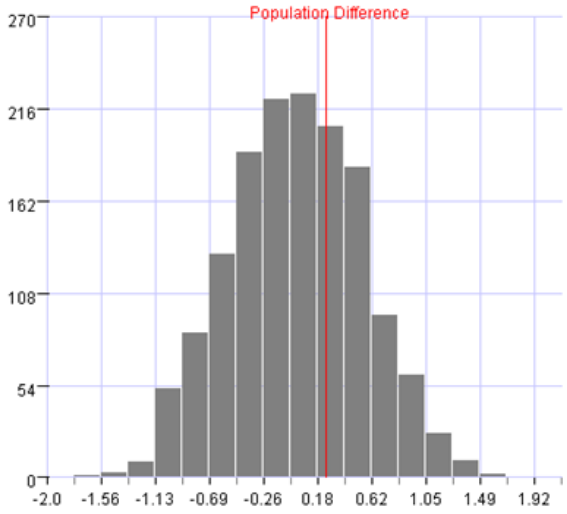
Simulations Name _____ A# ____

We have been investigating randomization distributions using technology. Each randomization distribution was formed by generating a large number of mean differences for two groups with specific treatments. Let's review some key points below.

The following is an example of a randomization distribution.



1) What does the x-axis show us?

2) What does the y-axis show us?

3) What information would you need to find a margin of error?

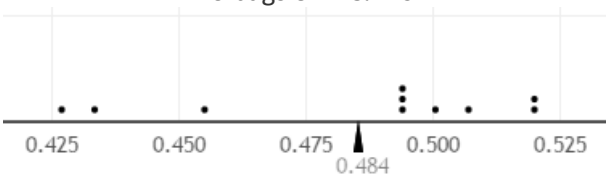
4) What information would you need to find the interval of the margin of error?

When using randomization distributions, it is important to note that you are comparing two groups with different treatments to determine whether or not one treatment has more of an effect than the other.

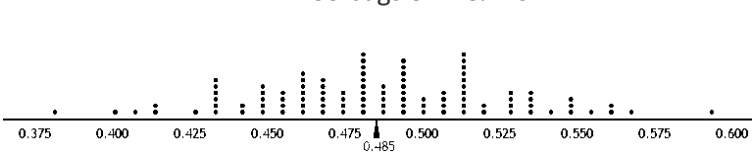
In comparison, we are going to begin looking at simulations. A **simulation** does not compare two different treatments. Instead, simulations are designed to model random events so that simulated outcomes closely match those of the real world. That is, a simulation uses a sample distribution to model a situation in the larger population that would be difficult to measure in real life.

For example, according to the manufacturer of M&M's, the Cleveland production plant uses the following color proportions for plain M&M's: Red=0.131, Orange=0.205, Yellow=0.135, Green=0.198, Blue=0.207, and Brown=0.124. Two sample distributions were created to investigate the proportion of green M&M's in a bag by first using 10 bags of M&M's and then increasing to 100 bags of M&M's. The results are shown below:

10 bags of M&M's



100 bags of M&M's



5) What does the x-axis show us in each of these sample distributions?

6) What do you notice about the two graphs? Based on your observations, what effect do you think increasing the number of bags in the sample distribution to 100 has?

7) What are the limitations of conducting such a large sample in real life?

Simulation One: Reese's Pieces

a) Fill in the chart as you go through this simulation.

N = 10	N = 100	N = 500
Sketch of Distribution	Sketch of Distribution	Sketch of Distribution
Estimated Proportion	Estimated Proportion	Estimated Proportion
Estimated Margin of Error	Estimated Margin of Error	Estimated Margin of Error
Estimated Confidence Interval	Estimated Confidence Interval	Estimated Confidence Interval

b) What does the x-axis represent in this distribution?

c) What happens to the margin of error as the sample gets larger? Why do you think this occurs?

d) In a sentence, describe for sample size 500 what the estimated proportion and margin of error tell you about the population proportion in context.

Simulation Two: Hollywood Movie Budget

a) Fill in the chart as you go through this simulation.

N = 10	N = 100	N = 500
Sketch of Distribution	Sketch of Distribution	Sketch of Distribution
Estimated Proportion	Estimated Proportion	Estimated Proportion
Estimated Margin of Error	Estimated Margin of Error	Estimated Margin of Error
Estimated Confidence Interval	Estimated Confidence Interval	Estimated Confidence Interval

b) What does the x-axis represent in this distribution?

c) What happens to the margin of error as the sample gets larger? Why do you think this occurs?

d) In a sentence, describe for sample size 500 what the estimated proportion and margin of error tell you about the population proportion in context.