Objectives:

- To use simulation to investigate how sample means vary from sample to sample.
- To discover the long-term pattern that emerges from ***the sampling distribution of the sample mean*** when the sample size is large.
- To learn that the long-term pattern does not depend on the shape of the population when the sample size is large.
- To recognize the similarities between the sampling distribution of a sample mean and of a sample proportion.
- To examine and understand the effects of ***sample size*** and of ***population variability*** on the sampling distribution of the sample mean.
- To continue to develop an understanding of the concepts of ***confidence*** and ***significance*** and their relation to sampling distributions.

Sampling Variability: Revisite. Repeated sampling of quantitative data gives you a ***sample mean***.
Repeated sampling of categorical data gives you a ***sample proportion***

Sampling Distribution: The long-term pattern that results from repeated sampling is called the ***sampling distribution.***

IMPORTANT: Make sure you understand the following concepts!

- The distribution of a sample will resemble that of the population – as the sample size increases the resemblance becomes more and more apparent. In other words as the sample approaches the size of the population the sample distribution will look more and more like the population distribution.
- Even when the distribution of the actual data is not normal, the sampling distribution becomes more and more normal as the sample size increases!!!
- The mean of all sampling distributions is equal to μ (the mean of the population).
- The variability (*i.e. standard deviation)* will decrease as the sample size increases.

Central Limit Theorem (CLT) for a sample mean:

If a SRS of size n is taken from a large population in which the variable of interest has a mean of μ and standard deviation σ, then, provided that n is large enough (at least 30):

- The distribution of the sampling means $\bar{x}$ is approximately normal with mean μ and standard deviation $\frac{\sigma}{\sqrt{n}}$.
- The approximation holds with large samples regardless of the shape of the population distribution.
- The approximation becomes more accurate as the size of the sample increases.
- For populations that are normally distributed, the result holds exactly.