Sampling Distribution Simulation

Instructions: This lab will demonstrate how sampling distributions are calculated and will help you understand the relationship between sample size, standard error, and the distribution of sample means. Before starting, you may want to review the formulas for standard error of the sample means and z-scores of the sample means.

Go to: https://onlinestatbook.com/stat_sim/sampling_dist/index.html. Read the information on the website. When you are ready to begin the simulation, click "Begin."

How to read the graphs: The red line in the extends from the mean one standard deviation in each direction. The colored vertical bars on the X-axis correspond to the statistic of the same color (Mean = **blue**, median = **pink,** standard deviation = **red**, etc.).

Part 1. Understanding Sampling Distributions

Click the "Animated sample" button. Five scores from a normal distribution will be sampled and plotted in a histogram. The mean of the sample will be computed and plotted in a second histogram. Repeat this 3- or 4- times.

1. How is the Distribution of Means created?
    - By plotting each sample mean

2. What do you notice about the Distribution of Means?
    - They pile up around the population mean
    - It becomes more normal as N gets larger

Click the "5 samples" button to sample 5 samples of 5 scores each. The five means will be plotted. Click the "10,000 samples" and/or "100,000 samples" until the distribution of means has stabilized. The sampling distribution of the mean is the distribution that is approached as the number of samples approaches infinity. With 5,000 to 10,000 you get a pretty good approximation.

3. What shape is the distribution?
    - Normal

Part 2. Understanding Central Limit Theorem

4. The central limit theorem states that the sampling distribution of the mean approaches a normal distribution as the sample size increases. Sample from the uniform distribution and determine how large a sample size is needed for the distribution to be a very close approximation of the normal distribution.
    - About 30