

## 9.3: Sample Size Demo

### Learning Objectives

- Compare the sampling distributions of different sample sizes

### Instructions

This simulation demonstrates the effect of sample size on the sampling distribution.

Depicted on the top graph is the population distribution. By default it is a uniform distribution (all values are equally likely). The sampling distributions for two different sample sizes are shown in the lower two graphs. The starting values are 2 and 10. By default, the statistic to be computed is the mean, although you can also specify to compute the median. For both the population distribution and the sampling distribution, the mean and the standard deviation are depicted graphically on the frequency distribution itself. The blue-colored vertical bar below the  $X$ -axis indicates the mean value. The red line starts from this mean value and extends one standard deviation in length in both directions. The values of both the mean and the standard deviation are also given to the left of the graph. Notice that the numeric form of a property matches its graphical form in color. In this simulation, you specify two sample sizes (the defaults are set at  $N = 2$  and  $N = 10$ ), and then sample a sufficiently large number of samples until the sampling distributions stabilize. Compare the mean and standard deviation of the two sampling distributions. Repeat the process a couple times and watch the results. Do you observe a general rule regarding the effect of sample size on the mean and the standard deviation of the sampling distribution? You may also test the effect of sample size with a normal population or with a different sample statistic (the median). When you have discovered the rule, go back and answer the questions again.

### Illustrated Instructions

#### Video Demonstration

The video below changes the population distribution from uniform to normal and then draws 30,000 samples with  $N = 2$  and 30,000 samples with  $N = 10$  by clicking the "10,000 Samples" 3 times. Notice the differences in the means and standard deviations of the two sample distributions. How do these compare to the population?

The vertical bar to the right of each sampling distribution can be dragged along the  $x$ -axis and once the mouse is released the area of the curve to the left of the line is displayed above the chart.

For some browsers you will not see the bars move as you move them. They will move when you release the mouse button.

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