Section 8.1 – Sampling Distribution of the Sample Mean

Suppose that a sample of size *n* is drawn from a population with mean μ and standard deviation σ.

The sampling distribution of $\bar{x}$ has mean $\mu_{\bar{x}} = \mu$ and standard deviation $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

In other words, the mean of the distribution is the same as the mean of the population (μ) and the standard deviation of the distribution is the same as the standard deviation of the population (σ) divided by the square root of the sample size $\left(\sqrt{n}\right)$.

If a random variable *X* is normally distributed, then the distribution of the sample mean $\bar{x}$ is also normally distributed.

<u>**Central Limit Theorem**</u>

As the sample size *n* increases, the sampling distribution of $\bar{x}$ will be approximately normal with mean $\mu_{\bar{x}} = \mu$ and standard deviation $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

(If $n \geq 30$, then we can assume the distribution is approximately normal regardless of the shape/distribution of the population.)

Working the probability problems in this section requires you to use the Normal Calculator in StatCrunch. For the mean, enter the mean of the population. For the standard deviation, enter the result when you divide the standard deviation of the population by the square root of the sample size. Then work the problem just like the normal probability problems in chapter 7.