The Central Limit Theorem is another important theorem that is useful in finding the sampling distributions of x and other statistics.

Pop-Up!

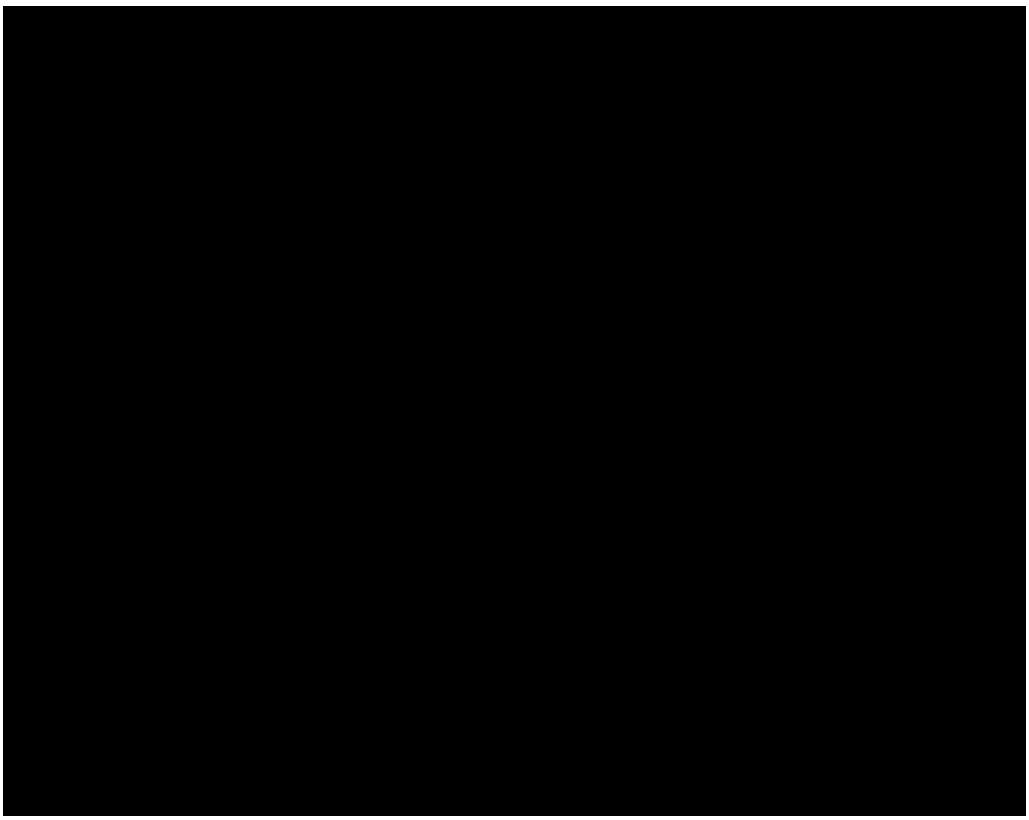
The Central Limit Theorem

If $\bar{x}$ is the mean of a random sample of size n, with n sufficiently large, taken from a population with mean μ_X and variance σ_X^2, then the sampling distribution of $\bar{x}$ is approximately normal with mean and variance given by

$$E(\bar{x}) = \mu_X \qquad \text{and} \qquad \text{Var}(\bar{x}) = \frac{\sigma_X^2}{n},$$

respectively.

This theorem is considered one of the most profound results in all of probability theory because it allows the use of statistical methods



It can be observed that:

- Regardless of the shape of the distribution of X, the shape of the sampling distribution of $\bar{x}$ becomes approximately normal as the sample size n increases. Even if the distribution of X is uniform (figure 8.3) or positively skewed (figure 8.4), the sampling

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