Sampling Distributions

Chapter 8

8.1 Distribution of the Sample Mean

- A Sampling Distribution of a statistic is a probability distribution for all possible values of the statistic computed from a sample of size *n*. The sampling distribution of the mean is a probability distribution of all possible values of the random variable 'x bar' computed from a sample of size *n* from a population with mean μ and standard deviation σ.
- Example 1: pg. 378- 380

  (Pay very close attention!)

Conclusions Based On The Sampling Distribution of x Bar

1. The sampling distribution is normally distributed.
2. It has mean equal to the mean of the population.
3. It has standard deviation less than the standard deviation of the population.

The Mean and Standard Deviation of the Sampling Distribution pg.382

- Suppose that a simple random sample of size n is drawn from a large population with mean μ and standard deviation σ.
- The sampling distribution of x bar will have mean μ of x bar = μ and standard deviation σ of x bar = σ / sq. root of *n*. (see formulas on pg 381)
- The standard deviation of the sampling distribution of x bar, σ of x bar, is called the standard error of the mean.
- Example: pg. 389, #12

The Shape of the Sampling Distribution

- If a random variable X is normally distributed with mean μ and standard deviation σ, then the distribution of the sample mean, x bar, is normally distributed with mean $\mu_{xbar} = \mu$ and standard deviation $\sigma_{xbar} = \sigma/\sqrt{n}$

The Central Limit Theorem Pg. 385

- Suppose a random variable X has population mean μ and standard deviation σ and that a random sample size *n* is taken from this population. Then the sampling distribution of x bar becomes approximately normal as the sample size *n* increases. The mean of the distribution is $\mu_{xbar} = \mu$ and the standard deviation is $\sigma_{xbar} = \sigma/\sqrt{n}$.

Central Limit Theorem Characteristics

1. $\mu_{xbar} = \mu$
2. $\sigma_{xbar} = \sigma/\sqrt{n}$
3. Regardless of the shape of the underlying population, the sampling distribution of x bar becomes approximately normal as the sample size, n, increases.

- Examples pg. 389-390: 18 and 22