**Section 7.2 - Sample Proportions** (pp. 432-441)

**1. The Sampling Distribution of**

Let’s turn once again to the hyena experiment . Suppose a team took one sample and found the proportion of males to be =0.20. Since another random sample would likely result in a different estimate, we can only say that “about” 20% of the population of hyenas in the Croatan NF are males. In this section, we are going to use sampling distributions to clarify what “about” means.**Activity**

|  |  |
| --- | --- |
| Suppose a team performed the hyena experiment again. First they chose repeated samples of size 5. The distribution of sample proportions is shown at the right.  Describe the shape: |  |
| The team then took repeated samples of size 10. The distribution of sample proportions is shown at the right.  Describe the shape: |  |
| Finally, the team took repeated samples of size 20. The distribution of sample proportions is shown at the right.  Describe the shape: |  |

Summarize what happened to the center, shape and spread as the sample size was increased from 5 to 20.

**Binomial Distribution** - Is the hyena experiment binomial? Let X = the number of males obtained in each sample. Is X a binomial random variable?

**B:**

**I:**

**N:**

**S:**

This means that =

From Chapter 6, we know that the mean and standard deviation of a binomial random variable X are:

= and =

|  |  |
| --- | --- |
| **Sampling Distribution of a Sample Proportion**  Choose an SRS of size *n* from a population of size *N* with proportion *p* of successes. Let be the sample proportion of successes. Then:   * The **mean** of the sampling distribution of is * The **standard deviation** of the sampling distribution of is   as long as the *10% condition* is satisfied: *n*≤(1/10)*N*. | |
| * As *n* increases, the sampling distribution of becomes **approximately Normal**. Before you perform Normal calculations, check that the *Normal condition* is satisfied: *np* ≥ 10 and  *n(1-p)≥10*. | F7.14.jpg |

**Check Your Understanding** - About 75% of young adult internet users (ages 18-29) watch online video. Suppose that a sample survey contacts an SRS of 1000 young adult internet users and calculates the proportion in this sample who watch online video.

(a) What is the mean of the sampling distribution of ? Explain.

(b) Find the standard deviation of the sampling distribution of . Check that the 10% condition is met.

(c) Is the sampling distribution of approximately Normal? Check that the Normal condition is met.

(d) If the sample size were 9000 instead of 1000, how would this change the sampling distribution of ?

**2. Using the Normal Approximation of**

**Example** #1

A polling organization asks an SRS of 1500 first-year college students how far away their home is. Suppose that 35% of all first-year students actually attend college within 50 miles of home. What is the probability that the random sample of 1500 students will give a result within 2 percentage points of this true value?

**Example** #2

The superintendent of a large school district wants to know what proportion of middle school students in her district are planning on attending a four-year college or university. Suppose that 80% of all middle school students in her district are planning to attend a four-year college or university. What is the probability that an SRS of size 125 will give a result within 7 percentage points of the true value?