6.3 Confidence Intervals for Population Proportions

Point Estimate for the Population Proportion p ▸ Confidence Intervals for a Population Proportion p ▸ Increasing Sample Size to Increase Precision

▸ Point Estimate for the Population Proportion p

Recall from Section 4.2 that the probability of success in a single trial of a binomial experiment is p. This probability is a population **proportion.** In this section, you will learn how to estimate a population proportion p using a confidence interval. As with confidence intervals for μ, you will start with a point estimate.

> **DEFINITION**
>
> The point estimate for p, the population proportion of successes, is given by the proportion of successes in a sample and is denoted by
>
> $$\hat{p} = \frac{x}{n}$$
>
> where x is the number of successes in the sample and n is the number in the sample. The point estimate for the proportion of failures is $\hat{q} = 1 - \hat{p}$. The symbols $\hat{p}$ and $\hat{q}$ are read as "p hat" and "q hat."

Insight

In the first two sections, estimates were made for quantitative data. In this section, sample proportions are used to make estimates for qualitative data.

EXAMPLE 1

Finding a Point Estimate for p

In a survey of 1219 U.S. adults, 354 said that their favorite sport to watch is football. Find a point estimate for the population proportion of U.S. adults who say their favorite sport to watch is football. *(Adapted from The Harris Poll)*

Solution   Using $n = 1219$ and $x = 354$,

$$\hat{p} = \frac{x}{n}$$

$$= \frac{354}{1219}$$

$$\approx 0.290402$$

$$\approx 29.0\%.$$

Try It Yourself 1

In a survey of 1006 adults from the U.S., 181 said that Abraham Lincoln was the greatest president. Find a point estimate for the population proportion of adults who say Abraham Lincoln was the greatest president. *(Adapted from The Gallup Poll)*

a. *Identify x and n.*
b. *Use x and n to find $\hat{p}$.*