

## Lesson 55: Constructing a confidence interval for a pop. proportion

### Daily Data Collection

When you kiss your significant other, do you tilt your head to the left or right?

Calculate a 95% confidence interval for the proportion who tilt right.

#### *Kissing the right way?*

According to an article in the *San Gabriel Valley Tribune* (February 13, 2003), "Most people are kissing the 'right way.'" That is, according to the study, the majority of couples tilt their heads to the right when kissing. In the study, a researcher observed a random sample 124 couples kissing in various public places and found that 83/124 (66.9%) of the couples tilted to the right. Construct and interpret a 95% confidence interval for the proportion of all couples who tilt their heads to the right when kissing.

## Conditions:

**Randomly selected sample** – Look for the term SRS. Without random selection, we lose the ability to make inferences about the population.

**Normal Distribution** – We will be using Normal Curves to find probabilities, so we need the distribution to be Normal.

For Proportions:  $np \geq 10$  and  $n(1-p) \geq 10$  sometimes  $1 - p = q$

Note:  $p$  is the sample proportion, notation  $\hat{p}$

**Independent Observations** – In order to use our standard deviation formula, we need the sample size to be less than 10% of the population size, so  $10n < N$ . This is especially true when sampling without replacement.

**Standard Deviation** of the sample proportion:

$$\sigma_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Note:  $p$  is the sample proportion

## Proportions are always a Z-Test

A student sees an enormous jar that contains red and white beads and wonders what proportion of the beads are red. She collects a sample from the jar and counts 107 red beads and 144 white beads.

a. Create a 90% confidence interval for the proportion that are red.

b. The student sees a sticker near the bottom of the jar claiming the proportion of red and white beads to be equal. Do you agree?

The 2007 Youth Risk Survey questioned a random sample of 14,041 students in grades 9-12. Of these, 2808 said they had smoked at least one day in the past month. Construct a 99% confidence interval of the proportion of teen smokers.

### **Daily Data Collection**

True or False: You have a secret that would shock this class.

Calculate a 95% confidence interval for the proportion hiding a secret.