Kissing the Right Way?

Parameter: p = the true proportion of couples that tilt their heads to the right when kissing

Assess Conditions:
Random: The researcher observed a random sample of couples.
Large Sample Size: $n\hat{p}$ = 83 $\geq$ 10 and $n(1-\hat{p})$ = 41 . Since both values are greater than 10, we have satisfied the large sample size condition.
Independent: The number of couples in the population is more than 10(124) = 1240.

Name Interval: one-proportion z interval

Interval: $\hat{p} \pm z^* \sqrt{\dfrac{\hat{p}(1-\hat{p})}{n}}$ = $0.669 \pm 1.96 \sqrt{\dfrac{0.669(1-0.669)}{124}}$ = 0.669 $\pm$ 0.083 = (0.586, 0.752)

Conclude in Context: We are 95% confident that the interval from 0.586 to 0.752 captures the true proportion of couples that tilt their heads to the right when kissing.

Tattoos

Suppose that you wanted to estimate the p = the true proportion of students at your school that have a tattoo with 95% confidence and a margin of error of no more than 0.10.

Solution: Since we don't have any previous knowledge of the proportion of students with a tattoo, we will use $\hat{p}$ = 0.5 to estimate the sample size needed.

$1.96\sqrt{\dfrac{0.5(1-0.5)}{n}} \leq 0.10 \rightarrow \left(\dfrac{1.96}{0.10}\right)^2 (0.5)(1-0.5) \leq n \rightarrow n \geq 96.04$

So, we need to survey at least 97 students to estimate the true proportion of students with a tattoo with 95% confidence and a margin of error of at most 0.10.

How much homework?

Solution: $1.645\dfrac{154}{\sqrt{n}} \leq 15 \rightarrow \left(1.645\dfrac{154}{15}\right)^2 \leq n \rightarrow 285.2 \leq n$

The administrators need to survey at least 286 students.

We use 15 as the ME because we want an interval with a total size of 30 minutes, so its ± 15.