

SM3 Honors 7-6 Draw a Conclusion from a hands-on, real sample survey

(Using a statistic to estimate a Parameter)

OBJECTIVES:

- Use randomization to gather a SRS for a specific population of interest.
- Use a statistic to estimate a parameter at a 95% confidence interval.
- Do a formal write up to understand what should be included when any statistical conclusion is made.

Wikipedia claims that white is the most popular car color in North America. We don't have the resources to take a SRS of cars in North America, but I am curious what proportion of white cars we have at Timpanogos High School. Maybe High school teenagers like to be more colorful with their car choice.

Does anyone have a guess for the proportion of white cars here at Timpanogos? 28%

We are going to use statistics to answer this question since there is no way we have enough resources, including time, to look at every single car.

Can we determine cause and effect? *Many variables. Only an observation.*

Take a SRS from the population. (We have assigned each parking spot a number, using a random number generator on your calculator, ignoring repeats, take a SRS of 50 cars or more.) Write these #s under their corresponding areas on the board.

Go out in pairs and be extremely careful of traffic. Each person in the pair is responsible for collecting the data on 2 or 3 cars.

AREA:					
#	#	#	#	#	#
White	Non-White	White	Non-White	White	Non-White

$\frac{50}{\text{white: } 9}$ $n=34$
 NOT: 25
 NO CARS: 16

Our Sample's Proportion of White Cars is $\hat{P} = \frac{9}{34} = 0.26$

Does this mean that this is the true proportion of white cars here at Timpanogos high school?

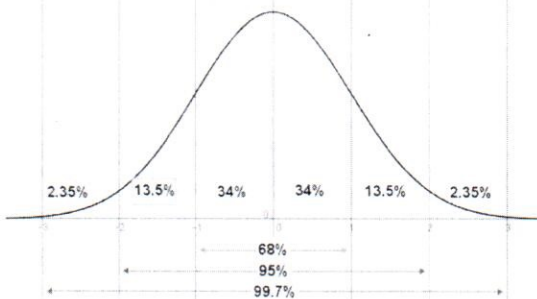
not really. not as big of sample as we hoped.

How confident are you that this one value is the true value?

pretty confident

What if we add in some wiggle room?

The wiggle room we add in is the margin of error. Since we assume that this follows a normal distribution, we know the confidence level that goes with the number of standardizations used so that we can calculate the margin of error.



Let's make sure that we are 95% confident in our claim.

State We want to estimate the proportion of white cars at THS, at a 95% confidence level.

Plan We will use a one-proportion z-interval.

DO use the empirical rule with 1.96 std. dev's away.

$$\hat{p} \pm 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \Rightarrow z\text{-score}$
how much the std. dev value is.

$$0.26 \pm 1.96 \sqrt{\frac{0.26(0.74)}{34}}$$

$$0.26 \pm 0.147$$

Conclude We are 95% confident that the true proportion of white cars at THS is between 0.113 and 0.407.

At the beginning, we had a guess or claim; do we have evidence to suggest 28% was correct with their claim?

28% is in our 95% C.I.