

Difference of 2 Proportion Z-Test with Car and Driver Magazine

Conduct a Difference of 2 Proportion Z-test as to whether there is a difference between enthusiasts versus non-enthusiasts for making a HONDA their most recent car purchase.

Check Conditions for ENTHUSIASTS

- random
- indep
- $n_1 < 10\%$ of population
- $n_1 \pi_1 \geq 10$
 $n_1(1-\pi_1) \geq 10$
- samples are indep from each other →

Check Conditions for NON-ENTHUSIASTS

- random
- indep
- $n_2 < 10\%$ population
- $n_2 \pi_2 \geq 10$
 $n_2(1-\pi_2) \geq 10$

$$H_0: \pi_e - \pi_n = 0$$

$$H_a: \pi_e - \pi_n < 0$$

$$p_{\text{enthusiast}} = \hat{p}_e = .08$$

$$p_{\text{non-enthus}} = \hat{p}_n = .11$$

$$p_c = \frac{.08(3534) + .11(1443)}{4977} = .0887$$

Formula and Math

$$z = \frac{\hat{p}_e - \hat{p}_n - \text{hypvalue}}{\sqrt{\frac{p_c(1-p_c)}{n_1} + \frac{p_c(1-p_c)}{n_2}}} = \frac{.08 - .11}{\sqrt{\frac{(.0887)(.9113)}{3534} + \frac{(.0887)(.9113)}{1443}}}$$

$$z = -3.3879$$

pvalue = essentially zero

Conclusion in Context:

B/c my p-value is basically zero, I reject H_0 .

The proportion of enthusiasts who buy a Honda is less than the proportion of non-enthusiasts who buy a Honda

OVER 

1443

2) According to Car and Driver February 2016 issue, the sample proportion of non-enthusiasts who said COMFORT was a PURCHASE PRIORITY was .88. This value is p-hat.

Conduct a 1 prop Z test, $\alpha = 0.05$ level, for the hypothesis that the true proportion is less than $\pi = 0.90$.

Ho: $\pi = .90$ $\hat{p} = .88$

Ha: $\pi < .90$

Formula in Letters

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

Formula with Numbers Subbed In

$$z = \frac{.88 - .90}{\sqrt{\frac{(.90)(.10)}{1443}}} = -2.518$$

$$P(z < -2.518) = .006$$

Conditions

- ① random } Not told in Car + Driver magazine, but I will assume both are true
- ② indep }
- ③ $n < 10\%$ - yes more than 14,400 car buyers
- ④ $n\pi \geq 10$ $1443(.90) \geq 10$ yes
 $n(1-\pi) \geq 10$ $1443(.10) \geq 10$ yes

Conclusion: B/c my pvalue (.006) < alpha (.05) I reject Ho.

The true proportion of car enthusiasts who said comfort was most important is less than 90%.

3) According to Car and Driver February 2016 issue, the sample proportion of enthusiasts who reported they had 3 OR MORE TEST DRIVES .34. This value is p-hat.

$n = 3534$

Are we safe to conclude that at least 33% of enthusiasts take 3 or more test drives? $\alpha = 0.10$

π = true proportion of enthusiasts who went on 3 or more test drives.

Ho: $\pi = .33$

Ha: $\pi > .33$

$\hat{p} = .34$

$$z = \frac{\hat{p} - \pi}{\sqrt{\frac{\pi(1-\pi)}{n}}} = \frac{.34 - .33}{\sqrt{\frac{.33(.67)}{3534}}} = 1.244$$

$$P(z > 1.244) = .1067$$

B/c pvalue > alpha I fail to Reject Ho.

It is likely only 1/3 of enthusiasts ~~to~~ take 3 test drives.

- ① random } see above
- ② indep }

③ $n < 10\%$ yes, there are more than 35,340 car enthusiasts in world

④ $n\pi \geq 10$ $3534(.33) \geq 10$ yes
 $n(1-\pi) \geq 10$ $3534(.67) \geq 10$
 large enough for normal