

A car company believes that the percentage of citizens in city ABC owns vehicle at 60% or less. A sales manager disagrees with this. He conducts a hypothesis testing survey with 250 residents and found that 170 responded yes to owning a vehicle.

State null & alternate hypothesis
At 10% significance level, is there enough evidence to support the idea that vehicle ownership in city ABC is 60% or less?

ANSWER :-

Given :- $x = 170$ $n = 250$

Significance level = 10% $\therefore \alpha = 0.1$

P_0 proportion = 60%

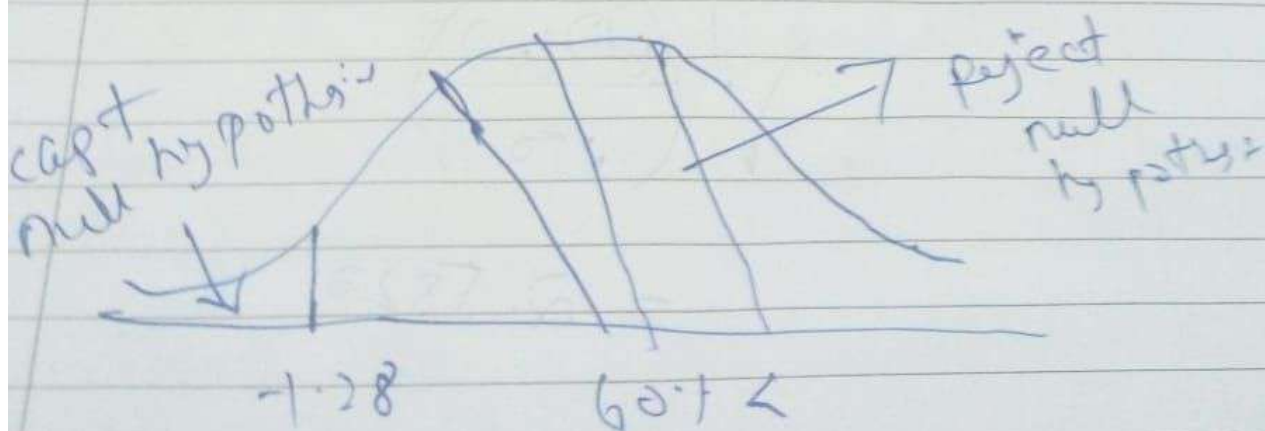
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Hypothesis :-

$$P_0 \leq 60\%$$

$$P_1 > 60\%$$

We have $\alpha = 0.1$ and hence we can draw the graph with this for 60%. Here the question is whether it is ~~60% or less~~ or ~~to~~ to find 60% or less.



$$\hat{p} = \frac{x}{n} = \frac{170}{250} = \frac{17}{25} = 0.68$$

$$p_0 = 0.6 = (60\%) \rightarrow \text{given}$$

$$q_0 = 1 - p_0 = 0.4$$

$$\alpha = 0.1$$

$$\alpha = 0.1 \text{ (10\% Significance level)}$$

Z-test with proportion.

$$= \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$= \frac{0.68 - 0.6}{\sqrt{\frac{(0.6)(0.4)}{250}}}$$

$$= \frac{0.08}{\sqrt{\frac{0.24}{250}}}$$

$$= 2.5820$$

= Finding P-value



$0.99506 \rightarrow$ z-score value

$$= 1 - 0.99506$$

$$= 0.00494$$

$$= 0.00494 + 0.00494$$

$$P\text{-value} = 0.00988$$

* It is proven that P-value (0.00988) is less than significance level (0.1) and z-score is (2.5820) with less than (-1.28).

Hence the evidence is against null hypothesis and there are more than 60% of voters on City ABC.