* A Car company believes that the percentage of residents in city ABC that owns a vehicle is 60% or less. A sales manager disaggrees with this. He conducts a hypothesis testing surveying 250 residents and found that 170 responded Yes to owning a vehicle

a) State the null & Alternate hypothesis

b) At 10% significance level is there enough evidence to support the idea that vehicle ownership in city ABC is 60% or less?

Ans:- Given $H_0 : P \leq 0.60$ → null Hypothesis

$H_a : P > 0.60$ → alternate hypothesis

$n = 250$, $\bar{x} = 170$

$$\hat{p} = \frac{\bar{x}}{n} = \frac{170}{250} = 0.68 \Rightarrow \hat{p} = 0.68$$

$$p_0 = 0.60, \quad q_0 = 1 - 0.60 \Rightarrow 0.40$$

significan level $\alpha = 10\% \Rightarrow 0.10$, Cofidence level $= 1 - 0.10 \Rightarrow 0.90$

⇒ Decision boundary

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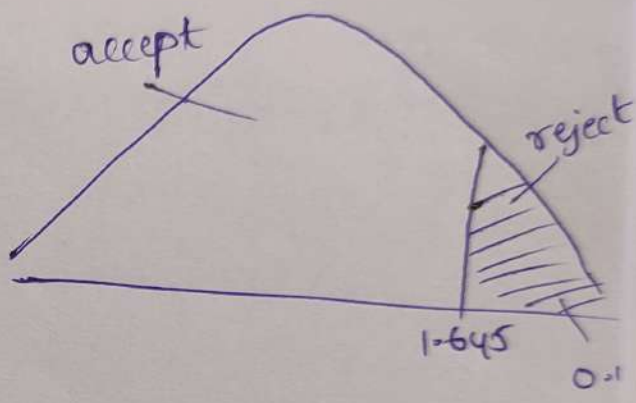
$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(0.40)}{250}}}$$

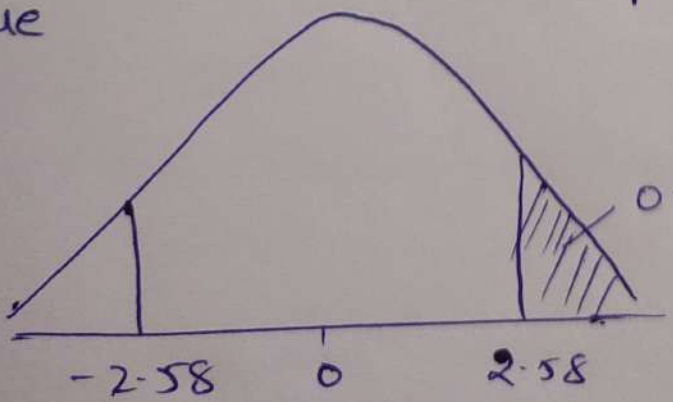
$$= \frac{0.08}{0.030984} = 2.58$$



$1.645 < 2.58$ reject hypothesis

At 10% significance there is enough evidence to reject the idea that the vehicle ownership city ABC is 60%.

P-value



p-value $= P(z \geq 2.58)$

0.099506

pvalue $= 0.099506 + 0.099506$

$= 0.19$

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