

Assignment - 6

Q. A car company believes that the percentage of residents in city ABC that owns a vehicle is 60% or less. Another A sales manager disagrees with this. He conducts a hypothesis testing surveying 250 residents and found that 130 responded yes to owning a vehicle.

- (a) State the null and 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?

Soln:-

①
$$H_0 : p_0 \leq 60$$
$$H_1 : p_1 \neq 60$$

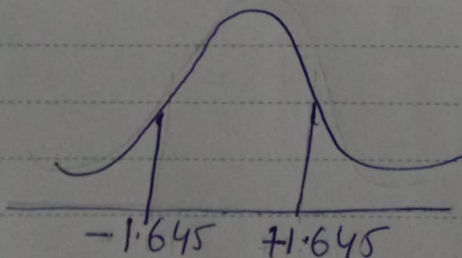
Given:- $n = 250, x = 130$

$$\hat{p} = \frac{x}{n} = \frac{130}{250} = 0.52, p_0 = 60\% = 0.6$$

$$q_0 = 1 - p_0 = 1 - 0.6 = 0.4$$

② $p\alpha = 10\% = 0.1, CI = 90\% \Rightarrow \alpha = 1.645$

③ Decision making



④ Calculate z-test statistics

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

$$= \frac{0.52 - 0.4}{\sqrt{\frac{0.6 \times 0.4}{250}}}$$

$$= \frac{0.12}{\sqrt{\frac{0.24}{250}}}$$

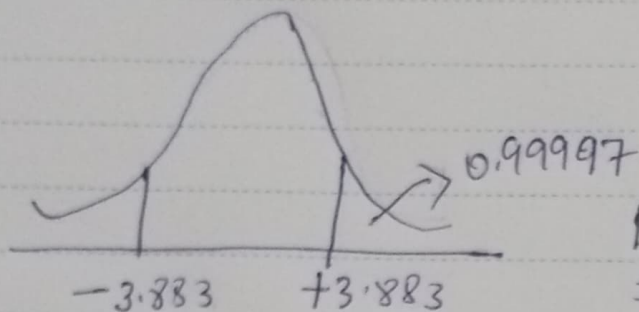
$$= \frac{0.12}{\sqrt{0.00096}} = \frac{0.12}{0.0309}$$

$$= 3.883$$

$$3.883 > 1.645$$

 (Reject)

or



$$1 - 0.99997$$

$$= 0.00003$$

$$0.00003 + 0.00003$$

$$= 0.00006$$

$\therefore 3.883 > 1.645$ (Reject Null Hypothesis)
 (Accept Alternate Hypothesis)