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Assignment :-3

A car company believes that the percentage of residents in a city ABC that owns a vehicle is 60% or less. A sales manager disagree with this. He conducts a hypothesis surveying 250 residents and found that 170 responds yes to owning a vehicle

a) State the Null or 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.

Solution :-

Step 1 :-

$H_0 : N \leq 60$ Null Hypothesis

$H_1 : N > 60$ Alternate Hypothesis

Step 2 :- One Tail

$n = 250$

$x = 170$ ... Yes for owning a vehicle

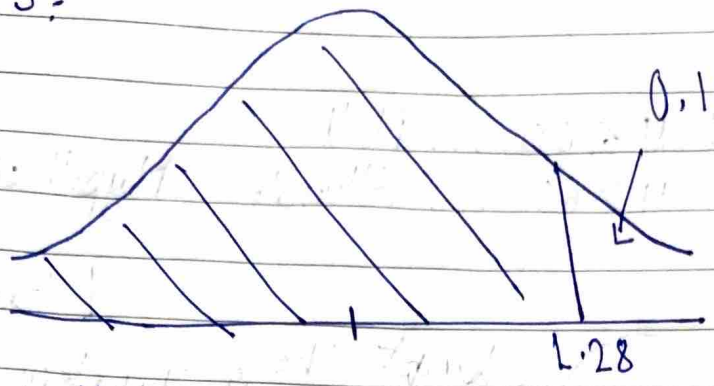
P_0 .... proportion

$$P = \frac{x}{n} = \frac{250}{170} = \frac{170}{250} = 0.68$$

$q_0 = 1 - P_0$ ... $[P_0 = 60\%]$

$= 1 - 0.68 = 0.4$

Step 3:-



Checking in Z score table

Value = 1.28

Step 4 :- Z -test test with proportion

$$Z \text{ test} = \frac{P - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$$

$P = 0.68$ ... Calculate above
$P_0 = 0.60$ ... given
$q_0 = 0.40$ ... given
$n = 250$ ... given

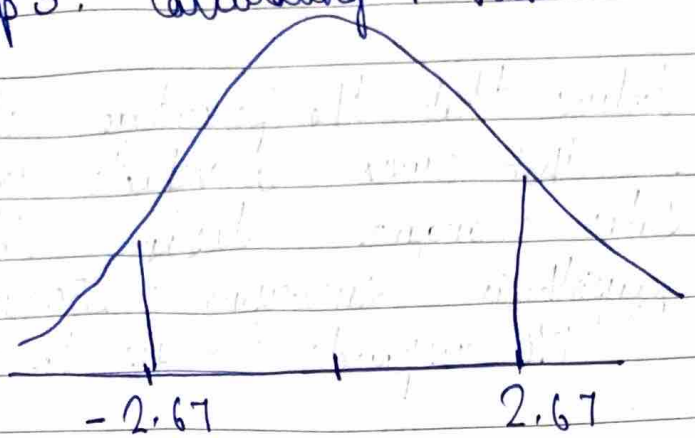
$$Z \text{ test} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}}$$

$$= \frac{0.08}{\sqrt{9.6 \times 10^{-4}}} = \frac{0.08}{\sqrt{0.00096}}$$

$$= \frac{0.08}{0.030} = 2.67$$

$2.67 > 1.28$ ... Reject the Null Hypothesis

Step 5:- Calculating P value



$2.67 = 0.99621$

$1 - 0.99621$

$= 3.79 \times 10^{-3}$

$= 0.00379$

P value $= 0.00379 + 0.00379$

$= 0.00758$

P value < Significance value

$0.00758 < 0.10$

Hence reject the Null Hypothesis