July 9 : A car company believes that The percentage of residents in City ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducts a hypothesis testing surveying 250 residents and found that 170 responded "Yes" to owning a vehicle.

Q:1) State the Null & Alternative Hypothesis.

2) At 10% Significance level, is there enough evidence to support the idea that vehicle ownership in city ABC is 60% or less.

A). $H_0 : \mu \leq 60$ - The percentage of residents is 60% or less.

$H_A : \mu > 60$ - The percentage of residents is greater than 60%.

Significance level $(\alpha) = 10\%$ or $0.10$

Hence Confidence Interval = 90% or 0.90.

This is a One-tailed test because we are interested in ensuring that the percentage of residents is 60% or less

Total no of people Surveyed(n) is 250, which is greater than 30, so we will use Z-test.

$n = 250$ ;

* Proportion of residents who answered "Yes" to owning a vehicle $(\hat{p}) = 170/250 = 0.68$

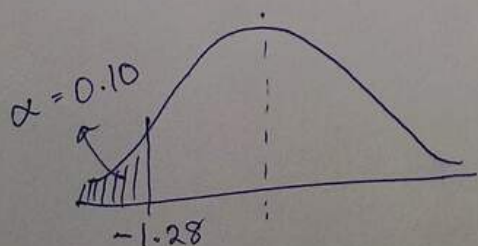* Proportion of residents who did not answer "Yes" to owning a vehicle $(\hat{q}) = 80/250 = 0.32$

$P_0$ : Proportion of Success = 60% or 0.6.

$Q_0$ : Proportion of failure = $1 - P_0 = 40\%$ or 0.4.

At 10% Significance, $\alpha = 0.10$.
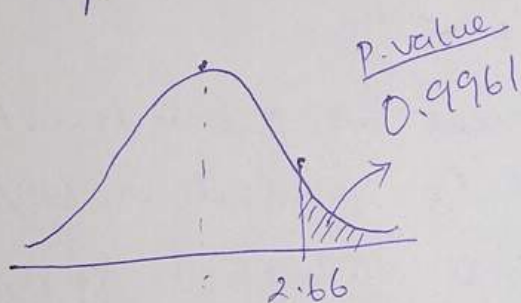Based on the Z-table, $Z_{0.10} = -1.28$
for a one-tailed test.

$\alpha = 0.10$

$-1.28$

Z-test with proportion $= \dfrac{\hat{p} - P_0}{\sqrt{\dfrac{P_0 * Q_0}{n}}} = \dfrac{0.68 - 0.6}{\sqrt{\dfrac{(0.6)(0.4)}{250}}}$

$$Z\text{-statistic} = 2.66$$

Conclusion: Z-statistic is greater than $Z_{c.l}$ at 0.1

$$2.66 > -1.28$$

Hence we **Accept** the $H_0$.

In order to find out the p-value, we look up the area under the curve for Z-statistic (2.66).



p-value
0.9961

2.66

At $Z_{2.66}$, the area under the curve is 0.9961..

Confirms the Conclusion: p-value is greater than $\alpha$

~~Conceptual~~

$$0.9961 > 0.10$$

Hence, we **Accept** the $H_0$.

The company is right in believing that the percentage of residents in city ABC is 60% or less.

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