6) A Co believes that the % of citizens in city ABC that owns a vehicle is 60% (or) less. A sales manager disagree with this. He conducted a hypothesis testing survey in 250 residents & found that 170 residents response yes to own a vehicle

a) State the null & Alternative Hypothesis

b) At a 10% of significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% (or) less.

Sol: It is Z-Test with proportion

① Null hypothesis: $H_0 : P_0 = 60\%$

Alternative hypothesis: $H_1 : P_1 \neq 60\%$

As it is a Two tail test. Hence from above given is $n = 250$, $x = 170$

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

P_0 is $q_0 = 1 - P_0 = 1 - 0.6 = 0.4$

② 10% significance level

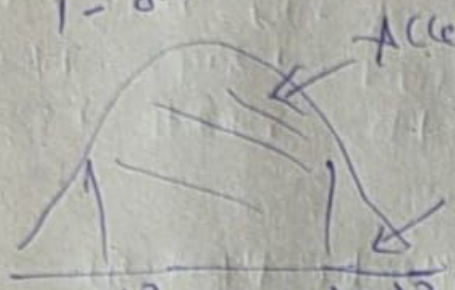
$Z_{\alpha} = 1 - 0.1$

$= 0.9$

$Z_{\alpha/2} = Z_{\frac{0.9}{2}} = Z_{0.45}$

$\therefore \alpha = 0.9$

$1 - 0.45 = 0.55$



When we go to Z table for this we get i.e., 0.13

④ Z-test with population

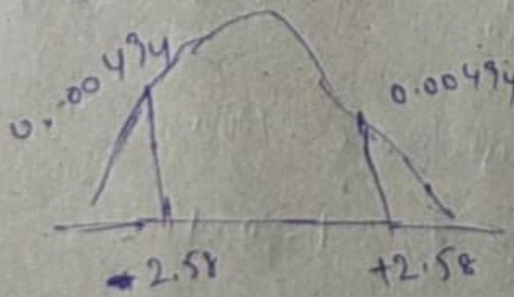
$$\text{Z-test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.6 \times 0.4}{250}}} = \frac{0.08}{\sqrt{\frac{0.24}{250}}}$$

$$= \frac{0.08}{\sqrt{0.00096}} = \frac{0.08}{0.03098386677}$$

$$\simeq 2.58$$

$2.58 > 0.13$ ∴ We Reject the Null hypothesis

P-Value :



$= 1 - 0.99506$

$= 0.00494$

P-value $= 0.00494 + 0.00494$

$= 0.00988$

pvalue < significance value (Reject Null hypothesis)

∴ There is No enough evidence to support the idea that vehicle owners in ABC is 60% cost less.