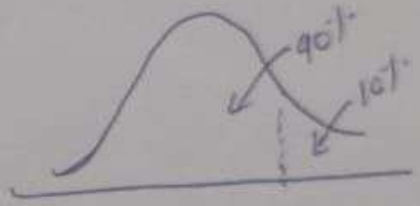
Q. A car company believes that % of residents in city ABC that owns a vehicle is 60% or less. A Sales manager disagrees with this. He conducts a hypothesis testing surveying 250 residents and found that 170 responded yes. to owning a vehicle

(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?.

Sol $H_0 \rightarrow$ ABC owns vehicle $\leq 60\%$

$H_1 \rightarrow$ ABC owns vehicle $> 60\%$

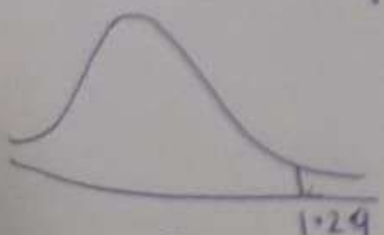


$P_0 = 0.6 = 3/5$, $q_0 = \frac{2}{5}$, $n = 250$

$\hat{p} = \frac{170}{250} = 17/25$

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{17/25 - 3/5}{\sqrt{\frac{3/5 \cdot 2/5}{250}}} = \frac{17-15}{25} \sqrt{\frac{25 \times 250}{6}}$$

$$= \frac{2}{25} \times 7 \sqrt{\frac{10}{6}}$$



$Z = 2 \times 1.29 = 2.58$

If significance level = 90% $\Rightarrow \alpha = 0.1$ for one tail z test

$\Rightarrow$ from one tail z table $\rightarrow z = 1.29$

Since $Z = 2.58 > 1.29 \Rightarrow$ Reject $H_0 \Rightarrow$ ABC owns vehicle 760%