3) A car manufacturer believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted a Hypothesis testing surveying 250 residents & found that 170 residents responded yes to owing a vehicle.

a) State Null & Alternate Hypothesis

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

Soln: i) Null Hypothesis (H_0) : $P_0 \leq 60\%$

Alternate Hypothesis (H_1) : $P_0 > 60\%$

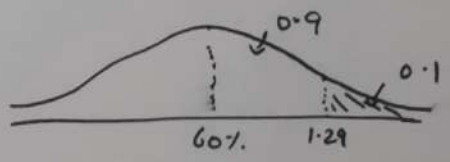
$n = 250$, $x = 170$, $\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68 = 68\%$.

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

ii) Significance level (α) = $10\% = 0.1$, CI = $90\% = 0.9$

iii) Decision Boundary, $Z_{0.1} = +1.29$ (one tail test)

iv) $Z_{test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}}$



$Z_{test} = 2.58$

Since, Z_{test} (2.58) > Z_α (1.29), we reject Null Hypothesis (H_0).

v) With respect to p-value, $Z_{2.58} = 0.99506$

Remaining area = $1 - 0.99506 = 0.00494$

Since, $0.00494 < \alpha$ (0.1), we reject Null Hypothesis (H_0)

Conclusion: There is not much evidence to support the idea that vehicle owner in city ABC is 60% or less. It might be greater than 60%.