

Assignment - 3

T-shirt Examples

Ans) Let us assume that we have 500 data out of which 200 out of 500 are L size t-shirt & 300 out of 500 are XL t-shirt.

we assume that $\alpha = 0.05$

$$1) \text{ Let } \hat{p}_1 = \frac{300}{500} \text{ and } \hat{p}_2 = \frac{200}{500}$$

$$\hat{p}_1 = 0.6$$

$$\hat{p}_2 = 0.4$$

$$\text{and } n_1 = 500, n_2 = 500$$

$$\text{upper bound} \Rightarrow \left[(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} \right]$$

which is the interval estimate for the difference of proportion

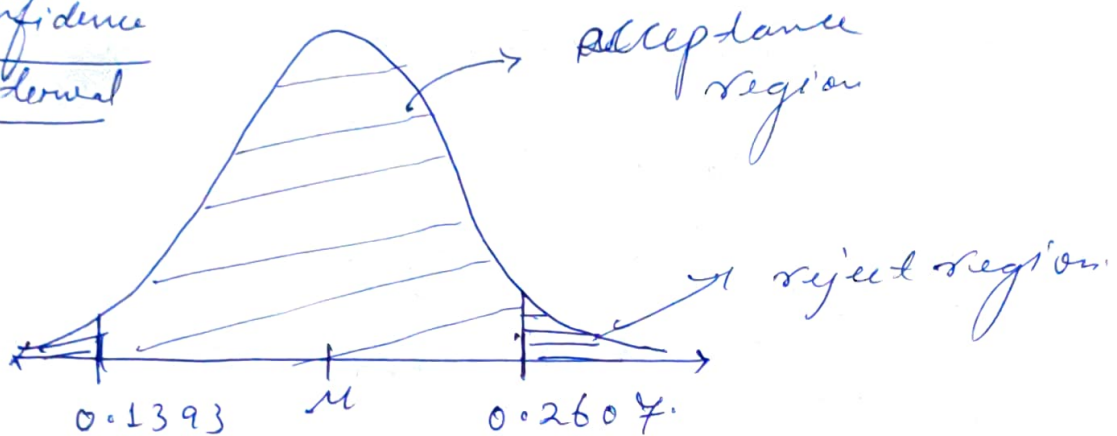
$$\begin{aligned} \text{upper bound} &= (\hat{p}_1 - \hat{p}_2) + z_{\alpha} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} \\ &= (0.6 - 0.4) + 1.96 \sqrt{\frac{0.6(1-0.6)}{500} + \frac{0.4(1-0.4)}{500}} \\ &= 0.2 + 0.0604 \\ &= 0.2604 \end{aligned}$$

$$\text{Lower bound} = (\hat{p}_1 - \hat{p}_2) - z_{\alpha} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$= 0.2 - 0.0607$$

$$= 0.1393$$

Confidence
Interval



The above Confidence Interval was for Sample Size $n=500$
Now, Confidence Interval for population size = 100k will be.

$$\begin{aligned}\text{Upper bound} &= 0.2607 \times 100,000 \\ &= 26070\end{aligned}$$

$$\begin{aligned}\text{Lower bound} &= 0.1393 \times 100,000 \\ &= 13930\end{aligned}$$

L.I for 100k
population

