Test of significance of large samples

Test for single mean:

Null Hypothesis $H_0 = \mu = \mu_0$

Test Statistics,

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

(or)

$$Z = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

Problem : 1

A sample of 900 members is found to have a mean of 3.4 cm and standard deviation is 2.61 cm is a sample from a population of mean 3.25 cm and standard deviation is 2.61 cm. If a population is normal and its mean is unknown find the 95% confidential limits of true mean.

Solution :

$\bar{x} = 3.4$ cm $\quad \mu = 3.25$ cm

$s = 2.61$ cm $\quad \sigma = 2.61$ cm

$n = 900$

Step : 1 → Formulate H_0 and H_1

$H_0 : \mu = 3.25$

$H_1 : \mu \neq 3.25$ [Two tail]

Step : 2 → Level of significance

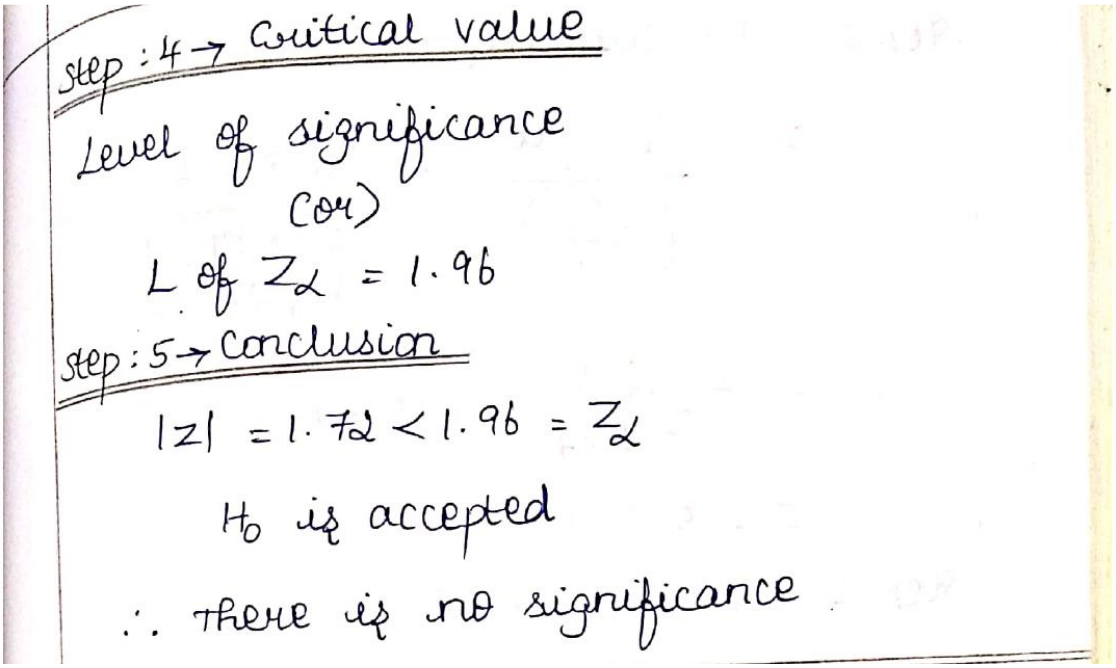
$\alpha = 5\%$

Step : 3 → Test Statistics

$$Z = \frac{\bar{x} - \mu}{\left(\frac{\sigma}{\sqrt{n}}\right)} = \frac{3.4 - 3.25}{\left[\frac{2.61}{\sqrt{900}}\right]}$$

$$= \frac{0.15}{\left[\frac{2.61}{30}\right]} = \frac{0.15}{0.087}$$

$$\boxed{Z = 1.724}$$



Step : 4 → Critical value

Level of significance

(or)

L of $Z_\alpha = 1.96$

Step : 5 → Conclusion

$|z| = 1.72 < 1.96 = Z_\alpha$

H_0 is accepted

∴ There is no significance