Question 1. There is an assumption that there is no significant difference between boys and girls with respect to intelligence. Tests are conducted on two groups and the following are the observations.

	Mean	Standard Deviation	Size
Girls	89	4	50
Boys	82	9	120

Validate the claim with 5% Level of significance.

Solution: Hypotheses :

H_0: There is no significant difference between the two groups. $(\bar{x}_1 = \bar{x}_2)$

H_a: There is a significant difference between the two groups. $(\bar{x}_1 \neq \bar{x}_2)$

$\Rightarrow$ $Z_{tabular} = \pm 1.96$ for 5% Level OF significance.

Statistics: Z test for two sample means.

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$\bar{x}_1 = 89$ $\quad \bar{x}_2 = 82$

$s_1^2 = 16$ $\quad s_2^2 = 81$

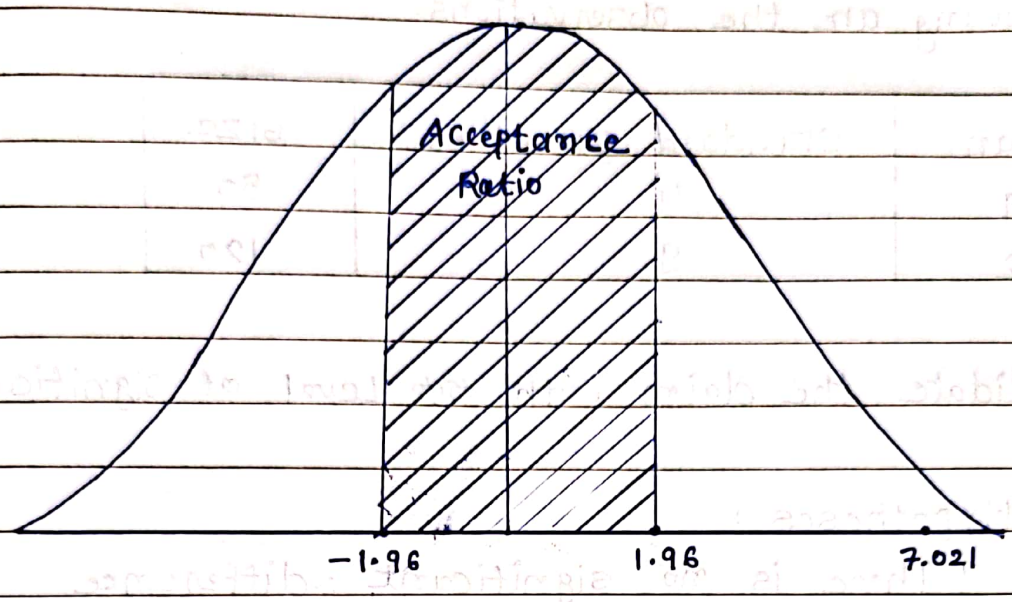
$n_1 = 50$ $\quad n_2 = 120$

$$Z = \frac{89 - 82}{\sqrt{\frac{16}{50} + \frac{81}{120}}} = \frac{7}{\sqrt{0.32 + 0.675}} = \frac{7}{\sqrt{0.995}} = \frac{7}{0.997}$$

$$Z = 7.021$$

Decision :

if z calculated value is greater than the z tabular value, reject the H_0.



Conclusion :

Since the z calculated value of 7.021 is greater than z-tabular value ±1.96 at 5% level of significance, the alternative hypothesis is confirmed which means that there is a significant difference between the two groups.