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DPP-4 Maths-IV Unit-5

Topic - Z test

Q- A random sample of 60 items gives the mean 10 and variance 20 can it be regarded as drawn from a normal population with 8 as mean at 5% level of significance?

Sol- $n = 60$
$\bar{x} = 10$
$\sigma^2 = 20$
$\sigma = \sqrt{20}$
$\mu = 8$
$\alpha = 5\%$

Null Hypothesis (H_0)

H_0: There is no significant difference between sample mean and population mean.

$H_0: \mu = 8$

Alternative Hypothesis (H_1)

$H_1: \mu \neq 8$ (Two tailed test)

Calculation of Z $\Rightarrow$ $Z = \dfrac{\bar{x} - \mu}{\dfrac{\sigma}{\sqrt{n}}}$

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$$Z = \frac{10-8}{\frac{\sqrt{20}}{\sqrt{60}}}$$

$$Z = \frac{2 \times \sqrt{60}}{\sqrt{20}}$$

$$\boxed{Z_{cal} = 3.46}$$

Level of significance (α) = 5%

$$= \frac{100-5}{2} = 47.5\%$$

$$= 0.475$$

From Z-test table

$$Z_{tab} = 1.96$$

Conclusion -

$$Z_{cal} = 3.46$$
$$Z_{tab} = 1.96$$

$\therefore Z_{cal} > Z_{tab}$

$\therefore$ H_0 Hypothesis is rejected.

Hence, there is significant diffrence between sample mean and population mean.

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