

PRACTICAL - 5

TESTING OF HYPOTHESIS

Q.1)

⇒ Hypothesis to be tested:-

$$H_0: \mu = 1000$$

v/s

$$H_1: \mu \neq 1000$$

Given :- $\alpha = 5\% = 0.05$, $n = 64$,
 $\bar{X} = 1038$, $\sigma = 146$

Now, Test Statistic;

$$Z = \frac{\bar{X} - \mu_0}{\sigma / \sqrt{n}} = \frac{1038 - 1000}{146 / \sqrt{64}}$$

$$= \frac{38}{18.25}$$

$$= 2.0821$$

$$\therefore Z_{cal} = 2.0821$$

Now, ~~$Z_\alpha = Z_{tab}$~~

For given $\alpha = 0.05$, the critical value is,

$$Z_\alpha = Z_{tab} = 0.05 + 1.9$$
$$= \underline{\underline{1.96}}$$

$$\therefore |Z_{cal}| > Z_\alpha$$

Conclusion:-

we reject H_0 at 5% l.o.s
i.e. the hypothesis that population mean is 1000 is rejected.

Q.3)

⇒ Hypothesis to be tested :-

$$H_0 : \mu_1 = \mu_2 \quad \text{v/s} \quad H_1 : \mu_1 > \mu_2$$

Given :- $n_1 = 1000$, $n_2 = 800$, $\sigma_1 = 45.2 \text{ cm}$,
 $\sigma_2 = 37.3 \text{ cm}$, $\alpha = 5\% = 0.05$
 $\bar{X}_1 = 150 \text{ cm}$, $\bar{X}_2 = 146 \text{ cm}$

Test statistic :-

$$Z = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$= \frac{(150 - 146)}{\sqrt{\frac{(45.2)^2}{1000} + \frac{(37.3)^2}{800}}}$$

$$= 2.056$$

$$\therefore Z_{cal} \approx 2.06$$

$$Z_\alpha = Z_{tab} = 1.64$$

$$\therefore |Z_{cal}| > Z_\alpha$$

Reject H_0 .

Conclusion :- we reject H_0

i.e. Urban area students are taller than other area students.

82)

⇒ Solution :-

Let H_0 : Digits may occur equally frequently in directory

H_1 : Digits may not occur equally frequently in directory.

Digit	O_i	E_i	$\frac{O_i^2}{E_i}$
0	1026	1000	1052.67
1	1107	1000	1225.44
2	997	1000	994.00
3	966	1000	933.15
4	1075	1000	1117.24
5	933	1000	870.48
6	1107	1000	1225.44
7	972	1000	944.78
8	964	1000	929.29
9	853	1000	727.60
	$\sum O_i = 10000$	$\sum E_i = 10000$	$\sum \frac{O_i^2}{E_i} = 10020.39$

$$E_i = \frac{1}{10} \times 10000$$

$$= 1000$$

$$E_i = N = 1000$$

We use χ^2 statistics as follows,

$$\chi^2 = \sum_{i=1}^K \left(\frac{O_i^2}{E_i} \right) - \sum N$$

$$= 10020.39 - 10,000$$

$$\chi^2 = 20.39$$

$$\therefore \chi^2_{cal} = 20.39$$

For $\alpha = 1\%$ the critical value is,

$$\chi^2_{tab} = 21.066$$

$$\chi^2_{cal} < \chi^2_{tab}$$

Conclusion:-

Here, we accept H_0

i.e. Digits may be taken to occur frequently equally in the directory.