

Page No.:
Date:

Module 1 :- Introduction to Statistics

Ques 1:-

→ H₀ (Null Hypothesis) :- There is no significant difference between boys and girls with respect to intelligence.

→ H_a (Alternate Hypothesis) :- There is significant difference between boys and girls with respect to intelligence.

→ Test Statistics :-

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$
$$= \frac{89 - 82}{\sqrt{\frac{4^2}{50} + \frac{9^2}{120}}}$$

$$Z \approx 7$$

→ Critical Value :- $|Z_{0.05}| = 1.96$

→ Here $7.02 > 1.96$

→ Hence, we fail to accept null hypothesis.

→ Conclusion :- At 5% level of significance there is significant difference between boys and girls with respect to intelligence.

Ques 2

- H_0 (Null Hypothesis) :- Smoking does not cause Cancer.
- H_e (Alternate Hypothesis) :- Smoking cause Cancer.
- Test Statistics :- χ^2

Obs Freq f_o	Expected freq $f_e = \frac{(R_i)(C_j)}{N}$	$\left(\frac{f_o - f_e}{f_e} \right)^2$	$\frac{(f_o - f_e)^2}{f_e}$
220	$f_e = \frac{550 \times 660}{1590} =$	235.22	0.98
230	$f_e = \frac{910 \times 550}{1590} =$	314.77	22.82
350	$f_e = \frac{990 \times 660}{1590} =$	423.3	12.7
$\frac{640}{990}$	$f_e = \frac{990 \times 910}{1590} =$	566.60	9.50
			$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$

$$\chi^2 = 46$$

→ Critical value :-

$$(r-1)(c-1) = 1$$

$$\therefore \chi^2_{0.05} (v=1) = 3.841$$

→ Here $46 > 3.841$

→ Hence, we fail to accept H_0 .

→ Conclusion:- Smoking cause Cancer.