DPP-7 Maths-4 Unit-5

Topic- X^2 - Test

Q-1- In an experiment on the immunisation of goats from anthrox, the following results were obtain. Derive your interferences on the efficiency of vaccine.

	Died anthrox	Survived
Inoculated with vaccine	2	10
Not inoculated	6	6

Sol- Null Hypothesis (H_0): Vaccine does not effect the immunisation of goats.

Contingency table -

2 (O_1)	10 (O_2)	12
6 (O_3)	6 (O_4)	12
8	16	24

$E_1 = \frac{8 \times 12}{24} = 4$	$E_2 = \frac{16 \times 12}{24} = 8$	12
$E_3 = \frac{8 \times 12}{24} = 4$	$E_4 = \frac{16 \times 12}{24} = 8$	12
8	16	24

Gateway Classes

O_i	E_i	$(O_i - E_i)^2$	$\frac{(O_i - E_i)^2}{E_i}$
2	4	4	1
10	8	4	0·5
6	4	4	1
6	8	4	0·5
			$\sum \frac{(O_i - E_i)^2}{E_i} = 2$

$\boxed{\chi^2_{cal} = 2}$

d·o·f = $(r-1)(s-1)$
= 1

Level of significance = 5% = 0·05

From χ^2-table -

$\chi^2_{tab} = 3·841$

Conclusion - $\because \chi^2_{cal} < \chi^2_{tab}$

$\therefore H_0$ is accepted.

Hence, Vaccine does not effective.

Gatway Classes

Download Our App from Google PlayStore
Helpline Number : 7455961284
PDF Notes PYQs Solution Recorded Lectures

GATEWAY CLASSES
Empowering learners, transforming futures

Q- By using χ^2-test, find out whether there is any association between income level and type of schooling.

Income	Public school	Govt. school
Low	200	400
High	1000	400

Sol: Null Hypothesis (H_0): There is no association between income level and type of schooling.

Contingency Table -

	200^{O_1}	400^{O_2}	600
	1000^{O_3}	400^{O_4}	1400
	1200	800	2000

$E_1 = \frac{1200 \times 600}{2000} = 360$ $\quad E_2 = \frac{800 \times 600}{2000} = 240$

$E_3 = \frac{1200 \times 1400}{2000} = 840$ $\quad E_4 = \frac{1400 \times 800}{2000} = 560$

O_i	E_i	$(O_i - E_i)^2$	$\frac{(O_i - E_i)^2}{E_i}$
200	360	25600	71.11
400	240	25600	106.6
1000	840	25600	30.47
400	560	25600	45.71

$\sum \frac{(O_i - E_i)^2}{E_i} = 253.89$

Download Our App from Google PlayStore
Helpline Number : 7455961284
PDF Notes PYQs Solution Recorded Lectures

d.o.f = 1

Level of Significance (α) = 5% = 0.05

$$\boxed{\chi^2_{tab} = 3.841}$$

Conclusion: $\chi^2_{cal} = 253.89$

$\chi^2_{tab} = 3.841$

$\therefore \boxed{\chi^2_{cal} > \chi^2_{tab}}$

$\therefore$ H_0 is not accepted

Hence, there is association between income level and type of schooling

Q-3:- The following data is collected on two characters:

	Smokers	Non smokers
Literate	83	57
Illiterate	45	68

Based on this information can you say that there is no relation b/w habit of smoking and literacy.

Sol- Null Hypothesis (H_0): There is relation b/w habit of smoking and literacy.

Contingency Table -

83^{91}	57^{02}	140
45^{03}	68^{04}	113
128	125	253

Gateway Classes

Download Our App from Google PlayStore
Helpline Number : 7455961284
PDF Notes PYQs Solution Recorded Lectures

GATEWAY CLASSES
Empowering learners, transforming futures

$E_1 = \frac{128 \times 140}{253} = 70.83$ $\quad E_2 = \frac{125 \times 140}{253} = 69.16$

$E_3 = \frac{128 \times 113}{253} = 57.16$ $\quad E_4 = \frac{125 \times 113}{253} = 55.83$

O_i	E_i	$(O_i - E_i)^2$	$\frac{(O_i - E_i)^2}{E_i}$
83	70.83	148.10	2.09
57	69.16	147.86	2.13
45	57.16	147.86	2.58
68	55.83	148.10	2.65

$\sum \frac{(O_i - E_i)^2}{E_i} = 9.45$

$\boxed{\chi^2_{cal} = 9.45}$

d.o.f = 1

Level of Significance (α) = 5% = 0.05

$\boxed{\chi^2_{tab} = 3.841}$

Conclusion : $\because \boxed{\chi^2_{cal} > \chi^2_{tab}}$

$\therefore H_0$ is not accepted

Hence, there is relation between habit of smoking and literacy.

Gateway Classes

Download Our App from Google PlayStore
Helpline Number : 7455961284
PDF Notes
PYQs Solution
Recorded Lectures