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"Ans-no ⇒ 10.2"

Test statistic,

$$\chi^2 = \sum \frac{Oi^2}{Ei} - n$$

$$Ei = \frac{n}{K} = \frac{206}{4} = 51.5$$

$$= \frac{1}{51.5} \times \left[50^2 + 42^2 + 32^2 + 82^2\right]$$

$$= 27.243$$

Since, $\chi^2 > \chi^2_{K-1} = \chi^2 > \chi^2_{4-1} = \chi^2 > \chi^2_3 = 7.815$

H_0 is not accepted, the proportion of road accident are not similar in various highways of Bangladesh. [Ans]

"Ans-no ⇒ 10.4"

Test statistic,

$$\chi^2 = \sum \frac{Oi^2}{Ej} - n$$

$$Ej = \frac{n}{K} = \frac{1000}{4} = 250.$$

$$= \frac{1}{250} \times \left[250^2 + 450^2 + 150^2 + 150^2\right] - 1000$$

Since, $\chi^2 > \chi^2_{K-1} = \chi^2 > \chi^2_{4-1} = \chi^2 > \chi^2_3$

$= 7.815$; H_0 is not accepted. the proportion of female students are not similar in various department of AIUB. [Ans]

"Ans-no ⇒ 10.5"

Here, $\bar{x} = \frac{1}{n} \sum x$

$$= \frac{1}{36} \times 761.6 = 21.15$$

$$S^2 = \frac{1}{n-1} \left[\sum x^2 - \frac{(\sum x)^2}{n}\right]$$

$$= \frac{1}{35} \times \left[16125.5 - \frac{(761.6)^2}{36}\right].$$

$$= 0.384$$

$$S = \sqrt{0.384} = 0.6197.$$

Test statistic, $z = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$

$= \frac{21.15 - 21}{0.6197/\sqrt{36}}$

$= 1.452 < 1.96$

So, H_0 is accepted, the population mean 21. [Ans]

"Ans-no ⇒ 10.7"

We need to test, $H_0: P = P_0 = 0.40$ vs $H_1: P \neq P_0$.

$p = \frac{a}{n} = \frac{8}{25} = 0.32$

Test statistics, $z = \frac{p - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$

$= \frac{0.32 - 0.40}{\sqrt{\frac{0.40 \times 0.60}{25}}} = -0.816$

Since, $|z| < 1.96$, H_0 is accepted, It can be considered overall proportion of female students 0.40 in AIUB.

[Ans]

"Ans-no ⇒ 10.9"

We need to test $H_0: P_1 = P_2$ vs $H_1: P_1 \neq P_2$

Test statistic,

$$z = \frac{P_1 - P_2}{\sqrt{pq\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$= \frac{0.25 - 0.144}{\sqrt{0.191 \times 0.809 \times \left(\frac{1}{100} + \frac{1}{125}\right)}}$

$= 2$

$P_1 = \frac{25}{100} = 0.25$

$P_2 = \frac{18}{125} = 0.144$

$p = \frac{a_1 + a_2}{n_1 + n_2} = \frac{25+18}{100+125}$

$= 0.191.$

$q = 1 - p = 0.809.$

Since $|Z| > 1.96$; H_0 is rejected. The probation problem is not same for boys and girls at AIUB [Ans].

"Ans-no ⇒ 10.11"

Blood Pressure	Heart Problem		Total
	Yes	No	
High	150	120	270
Not high	122	158	280
Total	272	278	550

- H_0: heart problem; does not depend on blood pressure.

H_1: blood pressure associated with heart problem.

$$X^2 = \frac{n(ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)}$$

$$= \frac{350 \times (150 \times 158 - 120 \times 122)^2}{270 \times 272 \times 278 \times 280}$$

$$= 7.897.$$

Since, $X^2 > X_t^2 = 3.84$; H_0 is rejected

So, blood pressure associated with heart problem. [Ans]

"Ans-no ⇒ 10.12"

Residential Origin	Full attention		Total
	Yes	No	
Rural	138	64	202
Urban	64	84	148
Total	202	148	350

H_0: Students does not classified by their residential origin and full attention

H_1: Origin and full attention are associated.

$$\chi^2 = \frac{n(ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)}$$

$$= \frac{350\times(138\times 84 - 64\times 64)^2}{202\times 202\times 148\times 148}$$

$$= 22.$$

Since, $\chi^2 > \chi_1^2 = 3.84$, H_0 is rejected; origion and full attention are associated.

[Ans]