Name:- Md. Tanvir Hossen

ID:- 20-42488-1 SL:-14

10.2/ We need to test, $H_0: P_1 = P_2 = P_3 = P_4$ Vs H_1: At least one of the doesn't hold test static.

test static.

$$\chi^2 = \sum \frac{O_i^2}{E_i} - n$$

$$= \frac{\sum (50)^2 + (42)^2 + (32)^2 + (82)^2}{51.5}$$

$$= 27.25$$

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

Since, $\chi^2 > \chi^2_{(K-1)=3}$, So, H_0 is not accepted.

Hence, the propotions of road accidents in various highways of Bangladesh is not similar.

10.4/ We need to test $H_0: P_1 = P_2 = P_3 = P_4$ Vs H_1: at least one of the female student doesn't hold the least static.

$$\chi^2 = \sum \frac{O_i^2}{E_i} - n$$

$$= \frac{\sum (250)^2 + (450)^2 + (190)^2 + (150)^2}{250} - 1000$$

$$= 240$$

$$E_1 = \frac{n}{K} = \frac{1000}{4} = 250$$

Since, $x^2 > x^2_{(K-1)=3} = x^2_3 = 7.81$. H_0 is accepted.
Hence, the proportions of female students in various department is not similar.

<u>Q.5</u> Let, $x \sim N(\mu, s^2)$, 6^2 is unknown

We need to test $H_0: \mu = \mu_0 = 21$ Vs $H_1: \mu \neq \mu_0$

$\therefore \bar{x} \frac{1}{n} \Sigma x = \frac{1}{36} \times 761.6 = 21.15$

$s^2 = \frac{1}{n-1}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right] = \frac{1}{36-1}\left[16125.5 - \frac{580034.56}{36}\right]$

$= 0.39; \therefore s = 0.63$

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

$= \frac{21.15 - 21}{0.63/\sqrt{36}} = 1.42$

Since, ~~$z < z_{(0,1)}$, So, H_0 is accepted.~~ Hence, we can ~~consider~~ the population mean as 21

Since: $|z| < 1.96$. H_0 is accepted.

10.7 $n = 25$; $a = 8$ $\therefore p = \frac{a}{n} = \frac{8}{25} = 0.32$

$P_0 = 0.40$, $Q_0 = 0.60$

$H_0 : P = P_0 = 0.40$

$$\therefore z = \frac{p - P_0}{\sqrt{\frac{P_0 Q_0}{n}}} = \frac{0.32 - 0.40}{\sqrt{\frac{0.40 \times 0.60}{25}}} = -0.816$$

$\therefore |z| < 1.96$; So, H_0 is accepted.

10.9 $n_1 = 100$, $n_2 = 125$, $a_1 = 25$, $a_2 = 18$

$\therefore p_1 = \frac{25}{100} = 0.25$ $\quad p = \frac{43}{225} = 0.101$

$p_2 = \frac{18}{125} = 0.144$ $\quad \therefore Q = 1 - 0.101 = 0.809$

$$\therefore z = \frac{p_1 - p_2}{\sqrt{PQ\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$= \frac{0.25 - 0.144}{\sqrt{0.101 \times 0.809 \times \left(\frac{1}{100} + \frac{1}{125}\right)}}$$

$$= 2.009$$

Since, $|z| > 1.96$. H_0 is rejected.

10.11

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

H_0: High pressure is not associated with heart problem.

H_1: High pressure is associated with heart problem

$$\chi^2 = \frac{550(150\times158-120\times122)^2}{270\times280\times272\times278} = 7.89$$

Since, $\chi^2 > \chi_1^2 = 3.84$. H_0 is rejected.

10.12

H_0: No association between origin and full attention.

H_1: Origin and full attention are associated

$$\chi^2 = \frac{350(138\times84-64\times64)^2}{202\times148\times202\times148} = 22.004$$

Since, $\chi^2 > \chi_1^2 = 3.84$.

H_0 is rejected.