

JOY MATUBBER  
20-41959-1

Section = 0  
Serial = 07

### Assignment-03

10.2.

Highways	1	2	3	4	Total
No. of road accidents ( $O_i$ )	50	42	32	82	206

We need to test  $H_0: P_1 = P_2 = P_3 = P_4$  vs  $H_1$ : At least one of them doesn't hold test statistic.

$$\chi^2 = \sum \frac{O_i^2}{E_i} - n \quad \left| \quad E_i = \frac{n}{K} = \frac{206}{4} = 51.5 \right.$$

$$= \frac{[50^2 + 42^2 + 32^2 + 82^2]}{51.5} - 206 = 27.24$$

Since,  $\chi^2 > \chi^2_{K-1}$  so,  $H_0$  is not Accepted.

10.4

Department	1	2	3	4	Total
No. of female student ( $O_i$ )	250	450	150	150	1000

We need to test  $H_0: P_1 = P_2 = P_3 = P_4$  vs  $H_1$ : At least one of them doesn't hold test statistic

$$\text{Now, } \chi^2 = \sum \frac{O_i^2}{E_i} - n = \frac{[250^2 + 450^2 + 150^2 + 150^2]}{250} - 1000$$

$$= 240$$

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

So,  $H_0$  is not Accepted.

10.5

Given that,

$$\mu_0 = 21.$$

$$\sum x = 761.6$$

$$\sum x^2 = 16125.5$$

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

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

$$= 21.15$$

$$s^2 = \frac{1}{n-1} \left[ \sum x^2 - \frac{(\sum x)^2}{n} \right] = \frac{1}{36-1} \left[ 16125.5 - \frac{5803456}{36} \right]$$

$$s^2 = \sqrt{0.96} = 0.60$$

$$s = 0.9 = 0.36$$

$$\text{Test statistic: } z = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{21.15 - 21}{(0.60/\sqrt{36})} = 1.5$$

Since

 $|z| < z_{(0.1)}$  so,  $H_0$  is Accepted. And we

can consider the population mean as 21.

10.7we need to test  $H_0: P_0 = P = 0.40$  vs  $H_1: P \neq P_0$ 

$$P = \frac{8}{25} = 0.32; Q_0 = 1 - P_0$$

$$P = 0.40$$

$$= 1 - 0.40$$

$$= 0.60$$

$$\text{Now, } |z| = \left| \frac{P - P_0}{\sqrt{\frac{P_0 Q_0}{n}}} \right| = \left| \frac{0.32 - 0.40}{\sqrt{\frac{0.40 \times 0.60}{25}}} \right| = |-0.81|$$

so,

 $|z| < 1.96$ ,  $H_0$  is Accepted at can be considered that 0.40 is the female student A.T.U.B



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10.9 We need to test  $H_0: p_1 = p_2$  vs  $H_1: p_1 \neq p_2$

$$p = \frac{25+18}{100+125} = 0.19 \quad \left| \quad p_1 = \frac{25}{100} = 0.25 \right.$$

$$q = 1-p = 1-0.19 = 0.81 \quad \left| \quad p_2 = \frac{18}{125} = 0.144 \right.$$

Test statistic  $|z| = \frac{p_1 - p_2}{\sqrt{pq(\frac{1}{n_1} + \frac{1}{n_2})}}$

$$= \frac{0.25 - 0.14}{\sqrt{(0.19)(0.81)(\frac{1}{100} + \frac{1}{125})}} = |2.08| = 2.08$$

Since,  $|z| > 1.96$ , so,  $H_0$  is not accepted, so, we can not consider that the probation problem is not same for boys and girl at AIVB.

10.11

Blood pressure	Heart problem	
	Yes	No
High	150	120
Not High	122	158

Now,

$$a+c = (150+122) = 272$$

And,

$$a+b = (150+120) = 270$$

$$ad = 150 \times 158$$

$$b+d = (120+158) = 278$$

$$= 23700$$

$$c+d = (122+158) = 280$$

$$bc = 14640$$

and  $n = 150$

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

$$= \frac{150(23700 - 14640)^2}{270 \times 272 \times 278 \times 280}$$

$$= 2.15$$

Since  $\chi^2 < \chi^2_{(n-1)}$ ; so,  $H_0$  is Accepted.

10.12

Residential origin	Full attention		Total
	Yes	NO	
Rural	198	64	262
Urban	64	84	148
Total	262	148	410

Test statistic:  $\chi^2 = \frac{n(ad-bc)^2}{202 \times 202 \times 148 \times 148}$

$$= \frac{380(1592 - 4096)^2}{202 \times 202 \times 148 \times 148}$$

$$= 22.12$$

Here,  
 $ad = 198 \times 84$   
 $= 16632$   
 $bc = 64 \times 64$   
 $= 4096$

$n = 380$

Since  $\chi^2 > \chi^2_{(n-1)}$ ; so,  $H_0$  is not Accepted.