

Appn 16

$$\begin{array}{ll} n_1 = 1200 & n_2 = 800 \\ x_1 = 452 & x_2 = 523 \\ s_1 = 212 & s_2 \end{array}$$

Hypothesis case:-  $H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

Since both sample size is greater than 30, Based on central limit

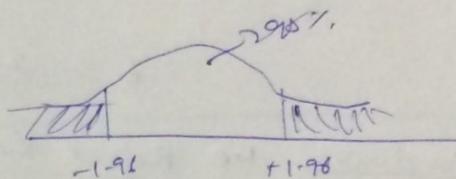
therefore

$$Z = \frac{(x_1 - x_2) - (\mu_1 - \mu_2)}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

For Null hypothesis  $\mu_1 - \mu_2 = 0$

$$= \frac{(452 - 523) - 0}{\sqrt{\frac{(212)^2}{1200} + \frac{(185)^2}{800}}}$$

$$= -7.93$$



Conclusion: we reject the null hypothesis

a)  $n_1 = 100$

$n_2 = 100$

$x_1 = 308$

$x_2 = 254$

$s_1 = 84$

$s_2 = 67$

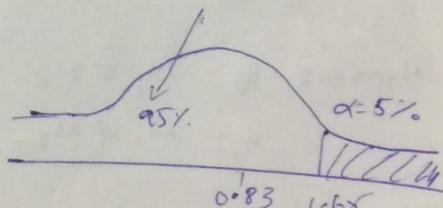
Hypothesis  $H_0: \mu_1 - \mu_2 \leq 45$

$H_1: \mu_1 - \mu_2 > 45$

$$Z = \frac{(x_1 - x_2) - (\mu_1 - \mu_2)}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

$$= \frac{(308 - 254) - 45}{\sqrt{\frac{(84)^2}{100} + \frac{(67)^2}{100}}}$$

$$= 6.8376$$



Conclusion: we fail to reject null hypothesis

3)

$$n_1 = 14$$

$$n_2 = 9$$

$$\bar{x}_1 = 0.317$$

$$\bar{x}_2 = 0.418$$

$$S_1 = 0.112$$

$$S_2 = 0.110$$

$$\text{Hypothesis} = H_0: \mu_1 = \mu_2$$

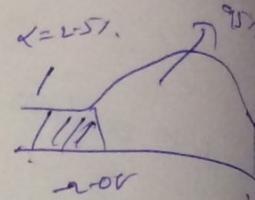
$$H_1: \mu_1 \neq \mu_2$$

$$\text{Degree of freedom} = n_1 + n_2 - 2$$

$$= 14 + 9 - 2$$

$$= 21$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{0.317 - 0.418}{\sqrt{\frac{(0.112)^2}{14} + \frac{(0.110)^2}{9}}}$$



$$t = 2.197$$

Conclusion: we reject the null hypothesis.

$$4) n_1 = 15$$

$$\bar{x}_1 = 12$$

$$x_1 = 6594$$

$$\bar{x}_2 = 6870$$

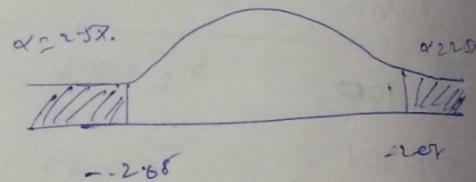
$$S_1 = 844$$

$$S_2 = 669$$

$$df = n_1 + n_2 - 2$$

$$= 15 + 12 - 2$$

$$= 25$$



$$\text{Hypothesis} : H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

$$t = \frac{6594 - 6870}{\sqrt{\frac{(844)^2}{15} + \frac{(669)^2}{12}}}$$

$$= -0.934$$

Conclusion: we fail to reject null hypothesis

7)  $n = 132$

$$\bar{u} = \frac{16 + 20 + 25 + 14 + 29 + 28}{6}$$

$$= 22$$

$$\sigma = \sqrt{\frac{\sum (u_i - \bar{u})^2}{n-1}}$$

$$= \sqrt{\frac{(16-22)^2 + (20-22)^2 + (25-22)^2 + (14-22)^2 + (29-22)^2 + (28-22)^2}{6-1}}$$

$$= 6.29$$

$$D.F = 6-1$$

$$= 5$$

$$\alpha = 5\%$$

$$\chi^2_{cal} = \sum \frac{(u_i - \bar{u})^2}{\sigma^2}$$

$$= \frac{(16-22)^2 + (20-22)^2 + (25-22)^2 + (14-22)^2 + (29-22)^2 + (28-22)^2}{6.29^2}$$

$$= 12.7 \approx 9$$

$$\text{for d.f } 5 \text{ & } \alpha = 5\% \quad \chi^2 = 11.07$$

$$11.07 > 9$$

$$\chi^2 > \chi^2_{cal}$$

We fail to reject the null hypothesis

✓

5)  $n_1 = 1000$        $n_2 = 100$   
 $x_1 = 53$        $x_2 = 43$   
 $\hat{P}_1 = 0.53$        $\hat{P}_2 = 0.53$

Hypothesis  $H_0: P_1 = P_2$   
 $H_1: P_1 \neq P_2$

$$z^* = \frac{(\hat{P}_1 - \hat{P}_2) - D}{\sqrt{\hat{P}^*(1-\hat{P}^*)(\frac{1}{n_1} + \frac{1}{n_2})}} = 0$$

$$\hat{P}^* = \frac{n_1 + n_2}{n_1 + n_2}$$

Conclusion: fail to reject hypothesis

6)  $n_1 = 300$        $n_2 = 700$   
 $x_1 = 120$        $x_2 = 140$   
 $\hat{P}_1 = 0.40$        $\hat{P}_2 = 0.20$

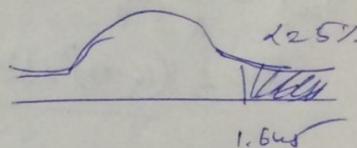
Hypothesis  $H_0: P_1 - P_2 \leq 0.10$   
 $P_1 - P_2 > 0.10$

$$D = 0.10$$

$$z = \frac{(\hat{P}_1 - \hat{P}_2) - D}{\sqrt{\frac{\hat{P}_1(1-\hat{P}_1)}{n_1} + \frac{\hat{P}_2(1-\hat{P}_2)}{n_2}}}$$

$$= \frac{(0.40 - 0.20) - 0.10}{\sqrt{\frac{0.40(0.60)}{300} + \frac{0.20(0.80)}{700}}}$$

$$= \frac{0.1}{0.032} = 3.118$$



Conclusion: we reject the null hypothesis

	men	women	total
voted	2792	3591	6383
not voted	1486	231	3617
	4278	5722	10000

$H_0$ : Gender is independent of voting

$H_1$ : Gender is dependent on voting.

R<sub>t</sub> row<sup>t</sup>, C<sub>t</sub> column<sup>t</sup>, t = total

$$\Sigma = \frac{(R_t * C_t)}{\text{Total}}$$

Expectedly

	voted	m	w	Total
N.V	1542	2070	3617	
	4278	5722		10000

	Yate Correction	w	-POTY
m	1.0	2.4	
v	1.4	1.0	4.2
N.V	2.4	1.4	
$\chi^2_{cal}$			6.6
df=1			
$\alpha = 5\%$			

$$(\text{observed}) \chi^2 = \sum \frac{(O-E)^2}{E}$$

$$\text{Yate correction} \quad \chi^2 = \sum \frac{[10 - E] - 0.5}{E}^2$$

$$\text{calculated value} = 6.6$$

$$\begin{cases} \chi^2 \text{ value} \\ df=1 \\ \alpha=5\% \end{cases} \quad \left. \right\} 3.84$$

$$\chi^2_{cal} (6.6) > \chi^2 (3.84) \text{ so}$$

we Reject the Null Hypothesis.

(9)

Observed	Hysgins	Ramdas	white	charlton
41	19	24	16	
expected	25	25	25	25

sample = 150

Number of Candidate = 4

$\Rightarrow 100/4 = 25$  for each

	Hysg	Ram	whit	char
$\chi^2_{\text{cal}} \left( O - E \right)^2 / E =$	10.24	1.44	0.04	3.24

$$\chi^2_{\text{cal}} = 14.96$$

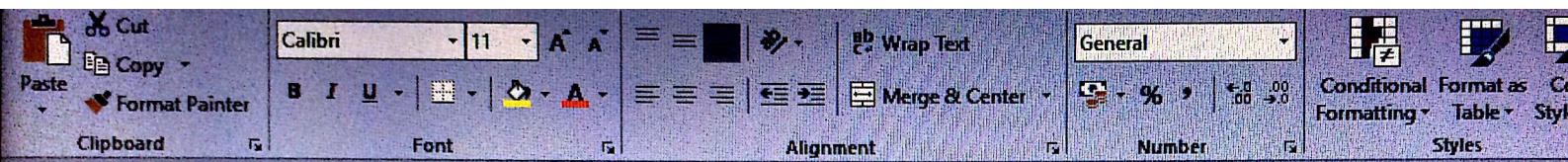
$$df = 3.$$

Hypothesis  $H_0$ : All candidates are equally popular

$H_1$ : Not equally popular.

Chi-square law table  $\chi^2_{df=3} \quad \left. \begin{array}{l} \chi^2_{df=3} \\ \alpha=0.05 \end{array} \right\} 7.82$

Since  $\chi^2_{\text{cal}} > \chi^2_{\text{table}}$ , Reject the null hypothesis



	A	B	C	D	E	F	G	H	I	J	K	L	M	N				
1	<b>Q10</b>																	
2	Observed	A	B	C	Total		Expected	A	B	C	Total							
3	5-6 yrs	18	22	20	60		5-6 yrs	12	18	30	60							
4	7-8 yrs	2	28	40	70		7-8 yrs	14	21	35	70							
5	9-10 yrs	20	10	40	70		9-10 yrs	14	21	35	70							
6	Total	40	60	100	200		Total	40	60	100	200							
7																		
8	(O-E)²/E	A	B	C	Total		H₀: There is no significant relationship between age and photograph preference											
9	5-6 yrs		3	0.9	3.3		H₁: There is significant relationship between age and photograph preference											
10	7-8 yrs		10.3	2.3	0.7		chi-square table, X² = 9.49 (assuming α = 0.05)											
11	9-10 yrs		2.6	5.8	0.7		Since X²calc (29.6) > X² (9.49), we reject the null hypothesis.											
12	X²calc =				29.6													
13	df =		4															
14																		
15	<b>Q11</b>																	
16	Observed	Support	No Suppo	Total			Expected	Support	No Suppo	Total		H₀: Frequency of conformity does not differ from expected.						
17	Conform		18	40	58		Conform		29	29	58		H₁: Frequency of conformity does differ from expected.					
18	Not Confo		32	10	42		Not Confo		21	21	42							
			50	50	100		Total		50	50	100							
20							chi-square table, X² = 3.84 (Assuming α = 0.05)											
21	( O-E -0.5)²/Support	Support	No Support				Since X²calc (18.1) is greater than X² (3.84), we reject the null hypothesis.											
22	Conform		3.8	3.8														

Q11																		
Observed	Support	No Suppo	Total		Expected	Support	No Suppo	Total		H0: Frequency of conformity doesn't depend on support, no support conditions								
Conform	18	40	58		Conform	29	29	58		H1: Frequency of conformity depends on support, no support conditions								
Not Confc	32	10	42		Not Confc	21	21	42										
Total	50	50	100		Total	50	50	100										
21	( O-E -0.5) Support	No Support																
22	Conform	3.8	3.8							chi-square table, X2 = 3.84 (Assuming $\alpha = 0.05$ )								
23	Not Confc	5.3	5.3							Since $X^2_{\text{calc}} (18.1)$ is greater than $X^2 (3.84)$ , we reject the null hypothesis.								
24	$X^2_{\text{calc}} =$			18.1														
25	$df =$			1														
26																		
27	Q12																	
Observed	Short	Tall	Total		Expected	Short	Tall	Total		H0: There is no relationship between height and leadership qualities								
Leader	12	32	44		Leader	20	24	44		H1: There is relationship between height and leadership qualities								
Follower	22	14	36		Follower	16	20	36										
Unclassifi	9	6	15		Unclassifi	7	8	15										
Total	43	52	95		Total	36	44	95										
33																		
34	$(O-E)^2/E$	Support	No Support							chi-square table, $X^2 = 5.99$ assuming $\alpha = 0.05$								
35	Leader	3.1	2.6							Since $X^2_{\text{calc}} (10.7) > X^2 (5.99)$ , we reject the null hypothesis.								

S43	X	✓	f(x)							
22 Conform	3.8	3.8								
23 Not Confo	5.3	5.3								
24 X2calc =		18.1								
25 df =	1									
26										
27 Q12										
28 Observed	Short	Tall	Total	Expected	Short	Tall	Total	H0: There is no relationship between height and leadership qualities H1: There is relationship between height and leadership qualities		
29 Leader	12	32	44	Leader	20	24	44			
30 Follower	22	14	36	Follower	16	20	36			
31 Unclassifi	9	6	15	Unclassifi	7	8	15			
32 Total	43	52	95	Total	36	44	95			
33										
34 (O-E)2/E	Support	No Support		chi-square table, $X^2 = 5.99$ assuming $\alpha = 0.05$						
35 Leader	3.1	2.6		Since $X^2_{\text{calc}} (10.7) > X^2 (5.99)$ , we reject the null hypothesis.						
36 Follower	2	1.7								
37 Unclassifi	0.7	0.6								
38 X2calc =		10.7								
39 df =	2									
40										
41 Q13										
42 Observed	Married	W/D/S	Never-ma	Total	Expected	Married	W/D/S	Never-ma	Total	H0: Men's marital status and labor force status are not related. H1: Men's marital status and labor force status are related.
43 Employed	679	103	114	896	Employed	654	109	133	896	
44 Unemploy	63	10	20	93	Unemploy	68	11	14	93	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
40																
41	<b>Q13</b>															
42	Observed	Married	W/D/S	Never-married	Total		Expected	Married	W/D/S	Never-married	Total					
43	Employed	679	103	114	896		Employed	654	109	133	896					
44	Unemployed	63	10	20	93		Unemployed	68	11	14	93					
45	Not in lab.	42	18	25	85		Not in lab.	62	10	13	85					
46	Total	784	131	159	1074		Total	784	131	159	1074					
47																
48	$(O-E)^2/E$	Married	W/D/S	Never-married	Total		chi-square table, $\chi^2 = 9.49$ assuming $\alpha = 0.05$									
49	Employed	1	0.4	2.6			Since $\chi^2_{\text{calc}} (31.6) > \chi^2 (9.49)$ , we reject the null hypothesis.									
50	Unemployed	0.4	0.2	2.8												
51	Not in lab.	6.5	5.6	12.3												
52	$\chi^2_{\text{calc}} =$				31.61											
53	$df =$	4														
54																
55																
56																
57																
58																
59																
60																
61																
62																

Sheet1



Ready



Type here to search

