H_0 - Null

H_1 - Alternet

→ $\frac{70\%}{100}$ ⇒ Null

-/+ ⇒ Alternet hypothesis

changes in any past program result would be alternet hypothesis

H_0 - We fail to reject null hypothesis

H_1 - Reject null hypothesis and accept Alternet hypothesis

① chi-square test - (Non-parametric test)

Eg. In the year 2000 USA "census" the age of individual in a small town were found to be the following.

< 18	18 - 35	> 35
20%	30%	50%

In year 2010 age of $n = 500$ individual were sample below are the result

< 18	18 - 35	> 35
121	288	91

using $\alpha = 0.05$, can you conclued dist. of ages has been changed in 10 year.

Soln :-

H_0 - Data meets the age dist.

H_1 - Dist. of ages has changed.

$\alpha = 0.05$

$C.I. = 1 - 0.05$

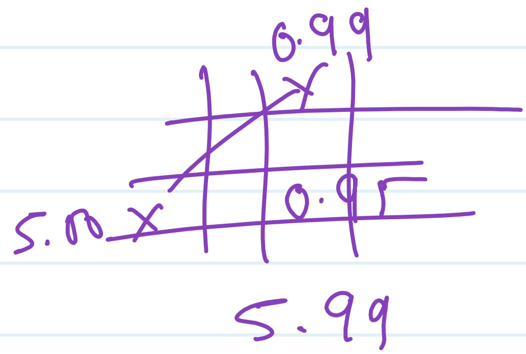
$= 0.95$

$n = 3$

Degree of freedom = $3-1 = 2$

<u>chi-square</u> $\chi^2 = \underline{5.99}$

<u>Table</u> $\Rightarrow$ <u>0.95</u>



$\Rightarrow$ <u>calculation</u>

$$\chi^2 = \sum_{i=1}^{n} \frac{(f_{o_i} - f_{e_i})^2}{f_e}$$

	<18	18-35	>18
f_o (observe value) =	121	288	91
f_e (expected value) =	$\frac{\cancel{500} \times 20}{\cancel{100}}$	$\frac{500 \times 30}{100}$	$\frac{500 \times 50}{100}$
	$\Rightarrow 100$	150	250

$$\chi^2 = \frac{(121-100)^2}{100} + \frac{(288-150)^2}{150} + \frac{(91-250)^2}{250}$$

$$\chi^2 = 232.4$$

calculate value far away from

$\chi^2 = 5.99$

so we can say

- We reject null hypothesis and accept Alternet hypothesis.

Eg. Evalute the relationship b/w 2 or more category variable

① 500 elementory school boys and girls are asked which are their favorite color blue, green, pink.

	Blue	green	pink	
boys	100	150	20	270
girls	20	30	180	230
	120	180	200	500

$\alpha = 0.05$, would you calculate there is a relationship b/w gender and color.

Soln

H_0 – no relation

H_1 – relation.

$\alpha = 0.05$

$CI = 0.95$

$$d.f. = (row-1) \times (column-1)$$

$$= (2-1) \times (3-1)$$

$$\Rightarrow 2$$

Desision rule = χ^2

chi-square table – 5.99

$\chi^2 > 5.99$ H_0 – Reject

$$\chi^2 = \sum_{i=1}^{n} \frac{(f_o - f_e)^2}{f_e}$$

$$f_e = \frac{f_c \cdot f_{row}}{n} \Rightarrow (\text{Boy, Blue}) = \frac{100 \times 270}{500} = 54$$

$$= (\text{Boy, green}) = \frac{150 \times 270}{500} = 81$$

$$= (\text{Boys, Pink}) = \frac{20 \times 270}{500} = 10.8$$

$$= (\text{girls, blue}) = \frac{20 \times 230}{500} = 9.2$$

$$(\text{girls, green}) = \frac{30 \times 230}{500} = 13.8$$

$$(\text{girls, Pink}) = \frac{180 \times 230}{500} = 82.8$$

$$\chi^2 = \frac{(100-54)^2}{54} + \frac{(150-81)^2}{81} + \frac{(20-10.8)^2}{10.8} + \frac{(20-9.2)^2}{9.2}$$

$$+ \frac{(30-13.8)^2}{13.8} + \frac{(180-82.8)^2}{82.8}$$

$$\chi^2 = \underline{\underline{251.6}}$$

$\chi^2 = 5.99$

so $251.6 > 5.99$

H_0 - reject

H_1 - Accept

Z-test

E.g. In a population the Avg IQ. $\mu = 100$ with $\sigma = 15$ than the doctor tested a new medication to find out whether it increase or decrease the IQ,

After one month sample of 30 participant were taken and 30 participant had $\bar{x}$ IQ. is 140, $\alpha = 0.05$

Soln

H_0 – no change

H_1 – change

$\alpha = 0.05 = 0.05/2 = 0.025$

C.I. = 0.975

we find the value of 0.975 in z-table

So

-1.96 to $+1.96$

Z-test

$$Z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$$

$$= \frac{140 - 100}{15/\sqrt{30}}$$

$$\boxed{Z = 14.65}$$

H_0 – we reject

H_1 = we Accept

E.g

$$\frac{90 - 100}{15/\sqrt{30}} = \underline{-3.096}$$

I.Q. Decrease

$\alpha = 0.1$ $\qquad$ $0.1/2 = 0.05$

Z-table = 0.95

= $\qquad$ $1 - 0.1 = 0.9$

for one tail = α

for two tail = $\alpha/2$

C.I. = $1 - \alpha$