



# Vidyavardhini's College of Engineering and Technology

## Department of Artificial Intelligence & Data Science

AY: 2024-25

Class:	TE	Semester:	V
Course Code:		Course Name:	Stats

Name of Student:	Sainath Khot
Roll No. :	20
Assignment No.:	3
Title of Assignment:	
Date of Submission:	
Date of Correction:	

### Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	
Demonstrated Knowledge	3	
Legibility	2	
Total	10	

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge	3	2	1
Legibility	2	1	0

### Checked by

Name of Faculty :

Signature :

Date :

Q. Investigate the association between the darkness of eye color in father & son from the following data & test of 5% level of significance. Note: Make contingency table compulsory.

	Dark	Not Dark	Total
Dark	48	90	138
Not Dark	80	782	862
Total	128	872	1000

$H_0$ : There is an association between darkness of eye color in father & son

$H_1$ : There is no association between the darkness of eye color in father & son.

Making contingency table (observed)

	Dark	Not Dark	Total
Dark	48	90	138
Not Dark	80	782	862
Total	128	872	1000

Converting table into observed & expected values:

	Dark	Not Dark	Total
Dark	$O_{11} = 48$ $E_{11} = 17.664$	$O_{12} = 90$ $E_{12} = 120.336$	138
Not Dark	$O_{21} = 80$ $E_{21} = 11$	$O_{22} = 782$ $E_{22} = 751.664$	862
Total	128	872	1000

$$\chi^2 = \sum_{E_{ij}} (O_{ij} - E_{ij})^2$$

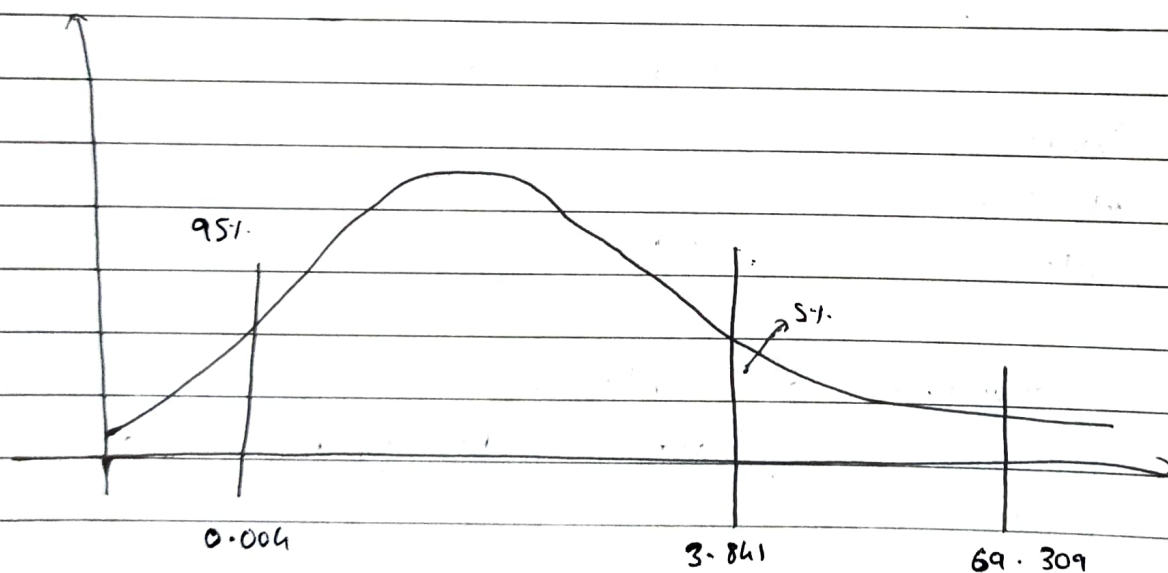
$$\begin{aligned} \therefore \chi^2 &= \frac{[48 - 17.664]^2}{17.664} + \frac{[90 - 120.336]^2}{120.336} + \frac{[80 - 110.336]^2}{110.336} \\ &\quad + \frac{[782 - 751.664]^2}{751.664} \end{aligned}$$

$$\therefore \chi^2 = 69.309$$

$$\therefore \text{Test statistic} = \chi^2 = 69.309$$

$$\therefore \text{Degree of freedom} = (r-1)(c-1) = (2-1)(2-1) = 1$$

$$\therefore \text{Level of significance} = 5\% = 0.05$$





Since  $69.309 > 3.841$ , Hence we accept null hypothesis (H<sub>0</sub>) & we conclude that there is an association between the darkness of eye color in father & son.

Q2 A weighing machine without any display was used by an average of 320 people a day with  $\sigma$  of 50 people. When an attractive display was used on the machine without, the avg for 100 days increased by 15 people. Can we say that display did not help much? Use a 5% level of significance

H<sub>0</sub>: The display helped (mean  $> 320$ )

H<sub>1</sub>: The display did not help (mean is still 320)

Right-tailed test

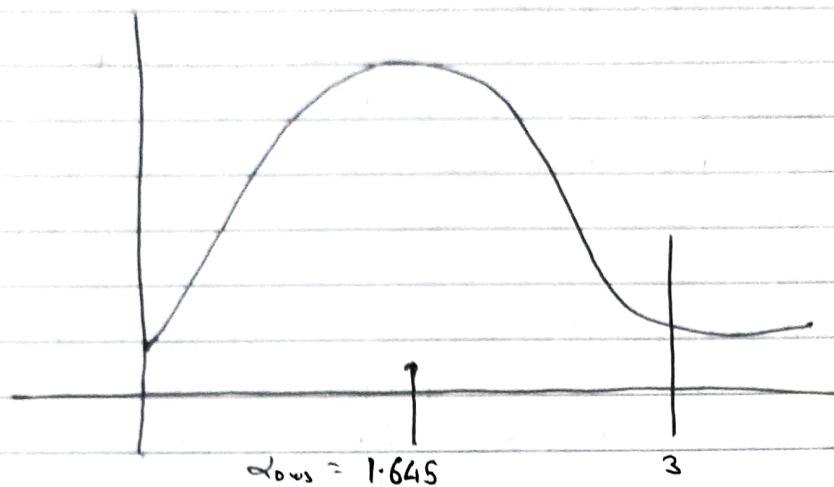
$\sigma = 50$  ;  $\mu_0 = 320$  ;  $\bar{x} = 335$  [increased avg];

$n = 100$  [n. of days]

$$Z_c = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{335 - 320}{50/\sqrt{100}} = \frac{15}{5} = 3$$

$\therefore$  level of significance = 5%

$$= 0.05$$



$\therefore 3 > 1.645$ , we accept the  $H_0$  (N.H) & we reject  $H_1$ , and we conclude that the attractive display helped in increasing the usage

