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PROBABILITY AND STATISTICS

Surprise Test -2

YANA SRIVASTAVA

Final Grade
Submitted 4/6/22, 9:52 PM (UTC+5:30) Not graded

Question scores appear after all grades are posted

Assignment Content

Question 1

Fitting a Straight Line to the data x: 0, 1, 2, 3, 4 and y: 1, 1.8, 3.3, 4.5, 6.3 then $\sum xy$ is

☐ A 10

☒ B 47.1

☐ C 48

☐ D 16.9

Feedback

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Question 2

An example in a Left tailed alternative hypothesis is:

☒ A $H_1: \mu < 0$

☐ B $H_1: \mu > 0$

☐ C $H_1: \mu \neq 0$

☐ D $H_1: \mu \geq 0$

Question 3

Fit a straight line to the following data:

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

Your Answer

Feedback

Feedback for student

Your instructor hasn't added feedback

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Fit a straight line to the following data -

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

Sol. Let the straight line is $y = a + bx$ — (i)

Normal equations are —

$$\sum y = \sum a + \sum bx$$

$$\sum y = a \sum 1 + b \sum x$$

$$\sum y = na + b \sum x$$

$$\sum y = \sum a + b \sum x \quad \text{--- (ii)}$$

After multiplying both sides by x —

$$\sum xy = a \sum x + b \sum x^2 \quad \text{--- (iii)}$$

x	y	xy	x^2
0	1	0	0
1	1.8	1.8	1
2	3.3	6.6	4
3	4.5	13.5	9
4	6.3	25.2	16
$\sum x = 10$	$\sum y = 16.9$	$\sum xy = 47.1$	$\sum x^2 = 30$

Here, $n = 5$, $\sum x = 10$, $\sum y = 16.9$, $\sum xy = 47.1$ and $\sum x^2 = 30$

Putting these values in normal eqⁿs, we get —

$$16.9 = 5a + 10b \quad \text{--- (IV)}$$

$$47.1 = 10a + 30b \quad \text{--- (V)}$$

$$\text{Eqn (V)} - 2 \times \text{Eqn (IV)}$$

$$10a + 30b = 47.1$$

$$10a + 20b = 33.8$$

$$10b = 13.3$$

$$b = 1.33$$

On putting the value of b in eqn (IV) -

$$5a + 10(1.33) = 16.9$$

$$5a + 13.3 = 16.9$$

$$5a = 3.6$$

$$a = 0.72$$

Date: / /

The average income of persons was Rs. 210 with a S.D. of Rs. 10 in sample of 100 people of a city. For another sample of 150 persons, the average income was Rs. 220 with S.D. of Rs. 12. The S.D. of incomes of the people of the city was Rs. 11. Test whether there is any significant difference the average income of the localities.

Sol. $H_0 = \bar{x}_1 = \bar{x}_2$
 $H_1 = \bar{x}_1 \neq \bar{x}_2$

Level of Significance, $\alpha = 0.05$

Critical Region accept null hypothesis if
 $-1.96 < Z < 1.96$

$$\bar{x}_1 = 210$$

$$S_1 = 10$$

$$x_1 = 100$$

$$\bar{x}_2 = 220$$

$$S_2 = 12$$

$$x_2 = 150$$

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} = \frac{210 - 220}{\sqrt{\frac{100}{100} + \frac{144}{150}}} = \frac{-10}{\sqrt{1.96}} = \frac{-10}{1.4} = -7.1428$$

$\Rightarrow H_0$ is rejected.