



SUNWAY

INT'L BUSINESS SCHOOL



Programme Name: BCS HONS

Course Code: CSC 1000

Course Name: Introduction to Statistics

Internal Examination

Date of Submission: 4/29/2021

Submitted By:

Student Name: **CSC_1000_Dipesh Tha Shrestha**

Submitted To:

Faculty Name: **Shanta Rayamajhi Basnet**

IUKL ID: **041902900028**

Department: **LMS**

Semester: **Third Semester**

Intake: **September 2019**

1. The owner of a restaurant that serves continental food wants to study characteristics of his customers. He decides to focus on two variables: the amount of money spent by customers and whether customers order dessert. The results from sample of 25 customers are as follows:
- Amount spent: $\bar{X} = \$9.7$, $S = \$4.5$
 - 12 customers purchased dessert.
- a. Construct a 95% confidence interval estimate of population mean amount spent per customer in the restaurant. (4 marks)
- b. The owner of competing restaurant wants to conduct a similar survey in her restaurant. This owner doesn't have access to the information of the owner of the first restaurant. Answer the following question: What sample size is needed to have 95% confidence of the estimating the population mean amount spent in her restaurant to within $\pm \$1.50$ assuming that the standard deviation is estimated to be \$ 4? (4 marks)

Solution

Dipesh Thakur Shrestha

Section A
Q No 1

Given,

$$\bar{x} = 9.7$$

$$n = 25$$

$$\sigma = 4.5$$

$$Z_{\alpha/2} = 1.96$$

(a)

Solution,

$$\bar{x} - E < \mu < \bar{x} + E$$

$$9.7 - 1.96\left(\frac{4.5}{\sqrt{25}}\right) < \mu < 9.7 + 1.96\left(\frac{4.5}{\sqrt{25}}\right)$$

$$7.936 < \mu < 11.464$$

95% interval is (7.936, 11.464).

(b)

Critical value $Z_{\alpha/2} = 1.96$ for 95%.

Maximum error of the estimate = ± 1.50
(σ) = 4.

Now,

$$S = Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}^2$$
$$= \left(\frac{1.96 \times 4}{1.50} \right)^2$$

$$= 27.36$$

Rounding this up to the next whole number
the required sample size is 28 //

2. You are the manager of a restaurant that delivers pizza to college dormitory rooms. You have just changed your delivery process in an effort to reduce the mean time between the order and completion of delivery from the current 25 minutes. A sample of 36 orders using the new delivery process yields a sample mean of 22.4 minutes and standard deviation of 6 minutes.

Using the five steps critical value approach, at the 5% level of significance, is there evidence that the population mean delivery time has been reduced below the previous population mean value of 25 minutes.

Vipesh Tha Shrestha

Section A
Q No 2

Given,

Step 1:

Population Mean (μ) = 25 min

Sample Mean (\bar{x}) = 22.4 min

Standard deviation (σ) = 6 min

Level of significance (α) = 5% = 0.05

Sample size (n) = 36

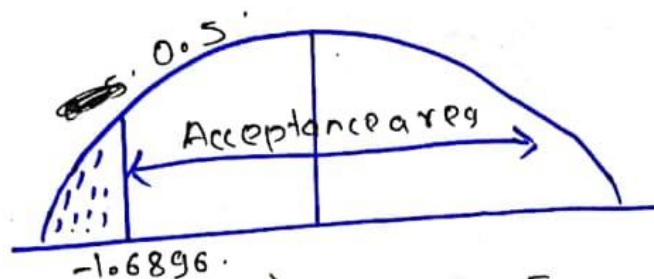
Step 2:

$$\begin{aligned} z\text{-cal/stat} &= \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \\ &= \frac{22.4 - 25}{6/\sqrt{36}} \\ &= -2.6 \end{aligned}$$

$$\begin{aligned} T_{\text{tab}} &= t(df, \alpha) \\ &= t(n-1, \alpha) \\ &= t(35, 0.05) \\ &= -1.6896 \end{aligned}$$

$$\begin{aligned} T_{\text{stat}} &< -1.6896 \\ -2.6 &< -1.6896 \\ -2.6 &< -1.6896 \end{aligned}$$

Step 4.



$$\begin{aligned} \text{Expectance Area} &= 0.5 - 0.05 \\ &= 0.45 \end{aligned}$$

Since, Z_{tab} lies in acceptance region will hypothesis is rejected & Hence, we can say that H_1 is accepted which means delivery time is less than 25 mins.

1. The table shows the information on CGPA and starting salaries (thousand) of seven recent university graduates.

CGPA	2.90	3.81	3.22	2.42	3.94	2.05	2.35
Starting Salary	28	38	25	35	40	25	28

- Determine the independent variable and dependent variable for the above data. Do you expect a positive or negative relation between these two variables?
(2 marks)
- Find the correlation coefficient for the given data.
(5 marks)
- Calculate the coefficient of determination. Interpret your answer.
(2 marks)
- Find the equation of the regression line for the data.
(4 marks)
- Use the regression equation to predicate the value of starting salary when CGPA is 3.67. If the CGPA is not meaningful to predicate the value of starting salary, explain your answer.
(2 marks)

Solution;

Dipesh Thak Shrestha

Section B
Q No 1

②

CGPA is independent Variable and Starting salary is the dependent variable.

I expect the positive relation between these two variables because the data shows that whenever the CGPA is increased, there is positive change in starting salary.

⑤

x	y	xy	x ²	y ²
2.90	28	81.2	8.41	784
3.81	38	144.78	14.51	1444
3.22	25	80.5	10.36	625
3.42	35	84.7	5.85	1225
3.94	40	157.6	15.52	1600
2.05	25	57.25	4.20	625
2.35	28	65.8	5.52	784
$\Sigma x =$ 20.69	$\Sigma y =$ 219	$\Sigma xy =$ 665.83	$\Sigma x^2 =$ 64.37	$\Sigma y^2 =$ 7087

Dipesh Tha Shrestha

Section B

(b)

$$\begin{aligned} r &= \frac{n \times \sum xy - \sum x \times \sum y}{\sqrt{n \times \sum x^2 - (\sum x)^2} \times \sqrt{n \times \sum y^2 - (\sum y)^2}} \\ &= \frac{7 \times 665.83 - (20.69 \times 219)}{\sqrt{7 \times 64.37 - (20.69)^2} \times \sqrt{7 \times 7087 - (219)^2}} \\ &= \frac{4660.81 - 4531.11}{\sqrt{450.59 - 428.076} \times \sqrt{49609 - 47961}} \\ &= \frac{129.7}{\sqrt{22.52} \times \sqrt{1648}} \\ &= \frac{129.7}{4.75 \times 40.6} \\ &= \frac{129.7}{192.83} \\ &= 0.6741 \end{aligned}$$

Dipesh Tha Shrestha

Section B
QNo1

©

Solution,

$$\begin{aligned}C:D &= r^2 \\&= (0.67)^2 \\&= 0.4 \\&= 44\%\end{aligned}$$

Since, CGPA and starting salary is co-related 44% but still there is the variation of 56% in the variable.

©

$$\begin{aligned}y &= b_0 + b_1x \\y &= 14.25 + 5.76x\end{aligned}$$

when

$$x = 3.67$$

$$\begin{aligned}y &= 14.25 + 5.76 \times 3.67 \\&= 35.38\end{aligned}$$

Here, B_0 is the y-intercept where the value of $x=0$, then y will be 14.27, Also b_1 is the slope, that means $b_1=5.76$, so, the trend is increasing and also conclude that in increase of unit of CGPA, the salary is increased by 5.76

Dipesh Th Shrestha

①

Solution,

The Regression equation of a line is:

$$Y = B_0 + B_1 X \dots \textcircled{1}$$

where

$$B_1 = \frac{n \cdot \sum xy - \sum x \cdot \sum y}{n \cdot \sum x^2 - (\sum x)^2}$$

$$= \frac{7 \times 665.83 - (20.69 \times 219)}{7 \times (64.37) - (20.69)^2}$$

$$= \frac{4660.81 - 4531.11}{450.59 - 428.07}$$

$$= \frac{129.7}{22.52}$$

$$= 5.76$$

Now,

$$B_0 = \bar{y} - b_1 \bar{x}$$

$$= 31.28 - 5.76 \times 2.95$$

$$= 31.28 - 16.99$$

$$= ~~14.29~~ 14.29$$

∴ Therefore, B_0 is the y-intercept, b where the value of $x=0$, then y will be 14.288, (14.29), $b_1 = 5.76$, so the trend is increasing and also conclude that in increase of 1 unit of cup, the salary is increased by 5.76.