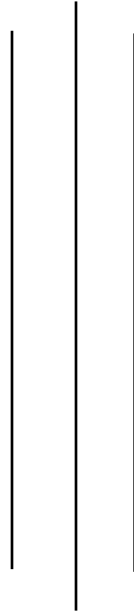




SUNWAY

INT'L BUSINESS SCHOOL



Programme Name: BCS HONS

Course Code: STAT 1000

Course Name: Introduction to Statistics

Open Book examination

Date of Submission: 5/27/2021

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Department: **LMS**

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Section A

Question 1

Dipesh Thakur Shrestha

Section A
Q No 1

Solution, .

(a)

Here, the total number of student = 40

Also, the corresponding degree of $x = 108^\circ$.

So,

$$\frac{x}{40} \times 360 = 108^\circ$$

$$\text{or } x = \frac{108 \times 40}{360}$$

$$\therefore x = 12 //$$

Therefore, Value of x is 12° ,

(b)

Now

$$\text{Total number of student} = 5 + x + 16 + y.$$

$$\text{or, } 40 = 5 + 12 + 16 + y.$$

~~$$27 + y = 33 + 40$$~~

$$\text{or } -y = 33 - 40$$

$$\text{or } -y = -7$$

$$\therefore y = 7.$$

Therefore, value of y is $7 //$

Dipesh Thakur Shrestha

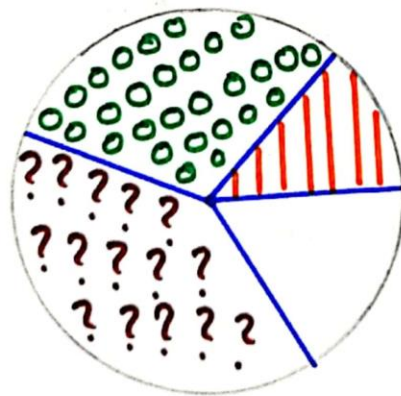
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Solution,

In order to obtain degree of frequency:

Body Mass	No of student	Degree of frequency
30 - 40	5	$\frac{5}{40} \times 360^\circ = 45^\circ$
40 - 50	12	108°
50 - 60	16	144°
60 - 70	7	63°
Total = 40		Total = 360°

Now, Pie Chart is given below.



Index

Body Mass	Symbol
30 - 40	
40 - 50	○○○○○
50 - 60	?????
60 - 70	

Fig: Pie Chart

Question 2

Dipesh Thakshrestha.

Section A
Q No 2

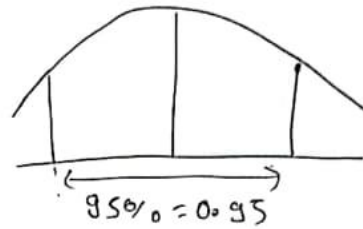
Given,

$$\mu = \$9.7$$

$$n = 25$$

$$\sigma = \$4.5$$

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



(a)

Solution,

$$= \mu - z < \mu < \mu + z$$

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

$$= 7.936 < \mu < 11.464$$

∴ 95% interval is (7.936, 11.464) //

(b)

Solution

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

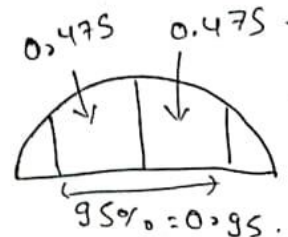
So, Maximum error of the estimate = ± 1.50
(σ) = 4.

Now,

$$n = z_{\alpha/2}^2 \frac{\sigma^2}{E}$$

$$= \left(\frac{1.96 \times 4}{1.50}\right)^2$$

$$= 27.36$$



∴ Therefore, Rounding this up to the next whole number the related sample size is 28.

Question 3

Dipesh Tha Shrestha

Section A

Q No 3

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:

$$z_{\text{cal/stat}} = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

$$= \frac{22.4 - 25}{6/\sqrt{36}}$$

$$= -2.6$$

$$T_{\text{tab}} = t(df, \alpha)$$

$$= t(n-1, \alpha)$$

$$= t(35, 0.05)$$

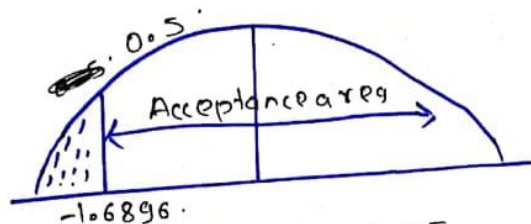
$$= -1.6896$$

$$T_{\text{stat}} < -1.6896$$

$$-2.6 < -1.6896$$

$$-2.6 < -1.6896$$

Step 4:



$$\text{Expectance Area} = 0.5 - 0.05$$

$$= 0.45$$

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.

Question 4

Dipesh Thakshrestha

Section A
Q No 4

Solution

For Mr A		For Mr B	
x	x ²	x	x ²
24	576	22	484
37	1369	40	1600
27	729	35	1225
30	900	24	576
31	961	26	676
34	1156	36	1296
36	1296	34	1156
26	676	28	784
29	841	30	900
33	1089	27	729
$\Sigma x = 307$	$\Sigma x^2 = 9593$	$\Sigma x = 302$	$\Sigma x^2 = 9426$

$$\begin{aligned}
 N &= 10 \\
 \bar{x} &= \frac{\Sigma x}{N} = \frac{307}{10} = 30.7 \\
 \text{S.D of A} &= \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2} \\
 &= \sqrt{\frac{9593}{10} - (30.7)^2} \\
 &= \sqrt{959.3 - 942.43} \\
 &= 4.1
 \end{aligned}$$

$$\begin{aligned}
 C.V_A &= \frac{\text{S.D}}{\bar{x}} \times 100\% \\
 &= \frac{4.1}{30.7} \times 100\% \\
 &= 19.36\%
 \end{aligned}$$

$$\begin{aligned}
 N &= 10 \\
 \bar{x} &= \frac{\Sigma x}{N} = \frac{302}{10} = 30.2 \\
 \text{S.D of B} &= \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2} \\
 &= \sqrt{\frac{9426}{10} - (30.2)^2} \\
 &= \sqrt{942.6 - 912.04} \\
 &= 5.53
 \end{aligned}$$

$$\begin{aligned}
 C.V_B &= \frac{\text{S.D}}{\bar{x}} \times 100\% \\
 &= \frac{5.53}{30.2} \times 100\% \\
 &= 18.31\%
 \end{aligned}$$

Dipesh Thakshrestha

Section A
Q No 4

(a) \Rightarrow As we know, C.V of A is less than of B. A has more consistency.
 \therefore Therefore, Mr A should be awarded by the Price.

(b) \Rightarrow Since, the mean value of Mr A is 30.7
and Mr B is 30.2.
Therefore, Mr A is better than Mr B, Because the mean value of A is high than of B.

(c) \Rightarrow Arranging data in Ascending Order.

For Mr A
24, 26, 27, 29, 30, 31, 30, 34, 36
37, $\therefore N = 10$

Position of median = $\left(\frac{N+1}{2}\right)^{\text{th}}$ term.
 $= \left(\frac{10+1}{2}\right)^{\text{th}}$ term.
 $= 5.5^{\text{th}}$ term.

So, median = $\frac{(5^{\text{th}} + 6^{\text{th}}) \text{ term}}{2}$
 $= \frac{30 + 31}{2}$
 $= 30.5$

For Mr B.
22, 24, 26, 27, 28, 30, 34, 35, 36,
40 $\therefore N = 10$

Position of median = $\left(\frac{N+1}{2}\right)^{\text{th}}$ term
 $= \left(\frac{10+1}{2}\right)^{\text{th}}$ term
 $= 5.5^{\text{th}}$ term.

So, median = $\frac{(5^{\text{th}} + 6^{\text{th}}) \text{ term}}{2}$
 $= \frac{28 + 30}{2}$
 $= 29$

\therefore Therefore, Mr A is more intelligent because Mr A median value is high or greater than of Mr B.

Question 5

Dipesh Thakshretha Q No 5

Solution//

② If 4 people are randomly selected.

Given,

$$p = 15\% = 0.15.$$

$$q = (100 - 15)\% = 85\% = 0.85.$$

Total trial $(n) = 4$.

Here, p represent the probability for left handed people.

① If all are left handed.

$$r = 4$$

$$\begin{aligned} P(r=4) &= {}^n C_r p^r q^{n-r} \\ &= {}^4 C_4 p^4 q^0 \\ &= 1 \times (0.15)^4 \times 1 \\ &= 0.00051 \end{aligned}$$

② For one of them to be left handed, $r = 1$

$$\begin{aligned} \text{Now, Probability } P(r=1) &= {}^n C_r p^r q^{n-r} \\ &= {}^4 C_1 p^1 q^3 \\ &= 0.368 \end{aligned}$$

For two of them to be left handed, $r = 2$.

$$P(r=2) = {}^n C_r p^r q^{n-r} = {}^4 C_2 (0.15)^2 (0.85)^2 = 0.098$$

For Three of them to be left handed, $r = 3$.

$$P(r=3) = {}^4 C_3 p^3 q^1 = {}^4 C_3 (0.15)^3 (0.85) = 0.012$$

Probability that at least one of them is left handed is

$$\begin{aligned} P(r \geq 1) &= P(r=1) + P(r=2) + P(r=3) + P(r=4) \\ &= 0.368 + 0.098 + 0.012 + 0.00051 \\ &= 0.47851 \end{aligned}$$

⑥ Dipesh Thapa Shrestha | Section A
Q No 5

Given,

Probability for left handed people (p) = 0.15.

Probability for Right handed people (q) = 0.85.

Number of trial (n) = 50.

① Mean Number of left-handed people.

$$\bar{x} = n \cdot p$$

$$= 50 \times 0.15$$

$$= 7.5.$$

② S.D for the number of left-handed people.

$$\sigma = \sqrt{npq}$$

$$= \sqrt{50 \times 0.15 \times 0.85}$$

$$= 2.53$$

Section B

Question 1

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.

(b)

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

P.T.O

Dipesh Tha Shrestha

Section B

(b)

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

∴ Therefore, 0.6741 is the correlation coefficient.

Dipesh Thakshrestha

Section B
Q No 1

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Solution,

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

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

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

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 14.25, 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,

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

$$= 31.28 - 5.76 \times 2.95$$

$$= 31.28 - 16.99$$

$$= \text{14.29}$$

∴ 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.

Thank You