Marks: 20
Comment: Excellent
Comment:

==========

=====

Assignment No.1 (Course STA301)
FALL 2025

Name :- Qalb-e-Momin
ID :- BC123456789

Question 1

The following are the exam scores (out of 100) of 24 students in a class:

56, 62, 68, 74, 71, 69, 85, 78, 81, 55, 60, 67, 72, 66, 59, 73, 88, 90, 47, 52, 64, 79, 61, 70

Construct a stem-and-leaf display for the data.

Solution 1

Data:

56, 62, 68, 74, 71, 69, 85, 78, 81, 55, 60, 67, 72, 66, 59, 73, 88, 90, 47, 52, 64, 79, 61, 70

Ascending order:

47, 52, 55, 56, 59, 60, 61, 62, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 78, 79, 81, 85, 88, 90

Stem-and-Leaf Display

Stem	Leaf
4	7
5	2 5 6 9

6	0 1 2 4 6 7 8 9
7	0 1 2 3 4 8 9
8	1 5 8
9	0

Question 2

Analyze the data provided in Question 1 to **determine the range** and the **interquartile range (IQR)**

Solution 2

Data:

56, 62, 68, 74, 71, 69, 85, 78, 81, 55, 60, 67, 72, 66, 59, 73, 88, 90, 47, 52, 64, 79, 61, 70

Ascending order:

47, 52, 55, 56, 59, 60, 61, 62, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 78, 79, 81, 85, 88, 90

1. *Range*

Range = Maximum – Minimum

= 90 – 47 = 43

2. *Interquartile Range (IQR)*

Total observations (n) = 24

Lower half:

47, 52, 55, 56, 59, 60, 61, 62, 64, 66, 67, 68

Q1 = median of lower half = average of 6th & 7th values

= (60 + 61) / 2 = 60.5

Upper half:

69, 70, 71, 72, 73, 74, 78, 79, 81, 85, 88, 90

Q3 = median of upper half = average of 6th & 7th values

= (74 + 78) / 2 = 76

IQR = Q3 – Q1

= 76 – 60.5 = 15.5

So:

I. **Range= 43**
II. **Interquartile range (IQR) = 15.5**

Question 3

A researcher collected the following paired observations on two variables Xand Y (both measured on an interval scale):

X	1	2	3	4	5	6	7	8
Y	2	3	5	4	6	8	7	9

Compute the Pearson correlation coefficient *r* between X and Y and interpret its value.

Solution 3

X	Y	XY	X^2	Y^2
1	2	2	1	4
2	3	6	4	9
3	5	15	9	25
4	4	16	16	16
5	6	30	25	36

6	8	48	36	64
7	7	49	49	49
8	9	72	64	81
$\sum$ = **36**	$\sum$ = **44**	$\sum$ = **238**	$\sum$ = **204**	$\sum$ = **284**

n=8, $\sum x = 36$, $\sum y = 44$, $\sum xy = 238$, $\sum x^2 = 204$, $\sum y^2 = 284$

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2]\,[n\Sigma y^2 - (\Sigma y)^2]}}$$

$$r = \frac{8(238) - (36)(44)}{\sqrt{[8(204) - (36)^2][8(284) - (44)^2]}}$$

$$r = \frac{1904-1584}{\sqrt{(336)(336)}}$$

$$r = \frac{320}{336}$$

$$r = 0.952$$

Interpretation:

r = 0.952 indicates a strong positive linear relationship between X and Y .

Question 4

A researcher collected the following paired observations on two variables Xand Y (both measured on an interval scale):

X	1	2	3	4	5	6	7	8
Y	2	3	5	4	6	8	7	9

Find the least-squares regression line of Y on X write $\hat{Y} = a + bx$.

Solution 4

X	Y	XY	X^2
1	2	2	1
2	3	6	4
3	5	15	9
4	4	16	16
5	6	30	25
6	8	48	36
7	7	49	49
8	9	72	64
∑ = **36**	∑ = **44**	∑ = **238**	∑ = **204**

n=8, ∑x=36, ∑y=44, ∑xy=238, $\sum x^2$=204,

Formula for Slop:

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

$$b = \frac{8(238) - (36)(44)}{8(204) - (36)^2}$$

$$b = \frac{1904-1584}{1632-1296}$$

$$b = \frac{320}{336} = \frac{20}{21} \approx 0.9524$$

Formula for intercept:

$$a = \bar{y} - b\bar{x} \rightarrow 1$$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{36}{8} = 4.5$$

$$\bar{y} = \frac{\Sigma y}{n} = \frac{44}{8} = 5.5$$

Putting the values in eq(1)

a = 5.5 - 0.9524(4.5)

a = 1.2143

Hence, the least – squares regression lines: $\hat{Y} = a + bx$

$$\hat{Y} = 1.2143 + 0.9524x$$

❖ **JOIN FOR TIPS, UPDATES & FREE RESOURCES:**

Click Here to Join WhatsApp Channel

(https://whatsapp.com/channel/0029VbAVi0F4CrfaQrxmPg3H)

And

Follow my Channel for BOOST your Final-Term Exam:

https://whatsapp.com/channel/0029Vb6WUs0KwqSLZB7ERj1n

Best of luck for everything ahead!

May Allah bless you with success, strength, and peace.

Please **remember me in your precious prayers**

and I'll do the same, In Sha Allah.

— Qalb-e-Momin