

Assignment No.2 (Course STA301)
Fall 2011 (Total Marks 30)
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Question 1:

Marks: 5+5=10

- a. Top ten students in MCS class in VU have following marks division in a CS paper.

89, 90, 85, 88, 83, 79, 95, 93, 81, 80

X	X ²
89	7921
90	8100
85	7225
88	7744
83	6889
79	6241
95	9025
93	8649
81	6561
80	6400
$\sum x = 863$	$\sum x^2 = 74755$

$$Mean = \frac{\sum x}{n}$$

$$Mean = \frac{863}{10}$$

$$Mean = 86.3$$

$$S.D = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

$$S.D = \sqrt{\frac{74755}{10} - (86.3)^2}$$

$$S.D = \sqrt{7475.5 - (7447.69)}$$

$$S.D = \sqrt{27.81}$$

$$S.D = 5.2735$$

Calculate the fraction of data falling in the limits $\bar{X} \pm S$, $\bar{X} \pm 2S$ and $\bar{X} \pm 3S$.

$$\bar{X} \pm S = (91.573, 81.026)$$

$$\bar{X} \pm S = (96.845, 75.753)$$

$$\bar{X} \pm S = (102.120, 70.4795)$$

- b. For a certain data, Mean = 4, Median = 3 and Standard Deviation = 2. Find Pearson's coefficient of skewness by using mode and interpret the results.

Answer

$$Mode = 3median - 2mean$$

$$Mode = (3 \times 3) - (2 \times 4)$$

$$Mode = 9 - 8$$

$$Mode = 1$$

So

$$S_k = \frac{\bar{X} - Mode}{S}$$

$$S_k = \frac{4 - 1}{2}$$

$$S_k = \frac{3}{2}$$

$$S_k = 1.5 > 0$$

Skewed is positive

Question 2:

Marks: 5+5=10

- a. First four moments about zero are given below

$$m'_1 = 2.5$$

$$m'_2 = 8.4$$

$$m'_3 = 11.6$$

$$m'_4 = 308.6$$

Find the coefficient of skewness and kurtosis.

Answer:

$$m_1 = 0$$

$$m_2 = 8.4 - (2.5)^2 = 2.15$$

$$m_3 = 11.6 - 3(8.4)(2.5) + 2(2.5)^3 = -20.15$$

$$m_4 = 308.6 - 4(11.6)(2.5) + 6(8.4)(2.5)^2 - 3(2.5)^4 = 390.4125$$

Coefficient of skewness and kurtosis

$$b_1 = \frac{(m_3)^2}{(m_2)^3} = \frac{(-20.15)^2}{(2.15)^3} = 40.8540$$

$$b_1 = \frac{m_4}{(m_2)^2} = \frac{(390.4125)}{(2.15)^2} = 84.459$$

b. For a certain data, we have following information

$$Q_1 = 24.9, Q_3 = 84.2, D_1 = 7.6 \text{ and } D_9 = 94.7$$

Calculate percentile coefficient of kurtosis and interpret the result.

Answer:

$$Q.D = \frac{Q_3 - Q_1}{2}$$

$$Q.D = \frac{84.2 - 24.9}{2}$$

$$Q.D = 29.65$$

$$D_1 = P_{10} = 7.6$$

$$D_9 = P_{90} = 94.7$$

Percentile coefficient of kurtosis

$$= \frac{Q.D}{P_{90} - P_{10}}$$

$$= \frac{29.65}{94.7 - 7.6}$$

$$= 0.3404$$

Question 3:**Marks: =2.5×5=10**

Ages and weights of Lahore city are given in the following table

Ages (X)	17.5	18.2	19.5	21	25	26	28	30	35	40	50
Weights (Y)	35	37	39	35	55	49	74	60	80	60	55

Calculate

- Simple regression line age on weight.
- Standard error of estimate for this line.
- By using the line, estimate the value of weights at the age of 55.
- Check, is there significant relation between ages and weights?

Answer:

Draw Table of X² and XY

X	Y	X ²	XY
17.5	35	306.25	612.5
18.2	37	331.24	673.4
19.5	39	380.25	760.5
21	35	441	735
25	55	625	1375
26	49	676	1274
28	74	784	2072
30	60	900	1800
35	80	1225	2800
40	60	1600	2400
50	55	2500	2750
$\sum X = 310.2$	$\sum Y = 579$	$\sum X^2 = 9768.74$	$\sum XY = 17252.4$

Simple regression line age on weight

Age on weight mean X on Y so we can say it Regression line as X on Y now, the formula is $X = a + bY$ Now use normal equations there as described in

Lecture # 15 page # 120 and 121