OPEN STUDENT FOUNDATION

Date : 21-02-2024 | **STD 12 Commerce Statistics** | **Total Marks : 91**

IMPORTANT QUESTIONS DAY 3 (CH 3)

*** Answer The Following Questions as Directed.** **[30]**

1. If $\bar{x}$ = 30, $\bar{y}$ = 20 and b = 0.6, find the intercept of the regression line of Y on X and write equation of the line.
2. If b = 1.5, r = 0.8 and standard deviation of X is 1.6, find the standard deviation of Y.
3. The fitted regression line of Y on X is $\hat{y}$ = 23.2-1.2x and one of the observations used in fitting of the line is (6,17). Find the error in estimating Y for X = 6.
4. If the regression coefficient of the regression line of Y on X in 0.6 and the standard deviations of X and Y are 5 and 3 respectively, find the coefficient of determination.
5. If the regression line of Y on X is $\hat{y}$ = 35 + 2x and Cov (x, y) = 50, find the standard deviation of X.
6. For the regression line given in the previous question (7)m if the value of Y is to be increased by 10 units, how many units should be increased in the value of X ?
7. If b_{yx} = 0.75, u = 6(x-20) and v = 2(y-15) for the data in the study of a regression line then find the value of b_{vu}.
8. If the regression line of Y on X is $\hat{y} = 12 - 1.5x$ and the mean of X is 6 , find the mean of Y.
9. If the regression line of Y on X is $\hat{y} = 11.5 + 0.65x$ and $\bar{y} = 18$, find $\bar{x}$.
10. The fitted regression line of Y on X is $\hat{y} = 50 + 3.5x$. If an observation $(16, 108)$ is used in fitting of the line, find the error in estimating Y for $X = 16$.
11. If one observation $(10, 30)$ is used in the fitting of the line $\hat{y} = 22 + 0.8x$, find the error in estimating Y for $X = 10$. What can you deduce from the value of the error ?
12. If $b_{yx} = 0.85, u = x - 15$ and $v = y - 20$, find the value of b_{vu}.
13. If $u = \frac{x-5}{3}, v = \frac{y-8}{5}$ and $b_{yx} = 0.9$, find the value of b_{vu}.
14. If $u = 10(x - 4.5), v = \frac{y-50}{10}$ and $b_{yx} = 0.25$, find the value of b_{vu}.
15. If $u = 5(x - 40), v = 2(y - 18)$ and $b_{yx} = 1.6$, find the value of b_{vu}.

*** Answer The Following Questions as Directed.** **[18]**

16. State the utility of regression.
17. If b_{yx} = 0.8 then find the value of b_{vu} = for the following u and v.

    (i) u = x – 105 and v = y – 90

(ii) $u = \frac{x-1400}{100}$ and $v = \frac{y-750}{50}$

(iii) u = 10(x - 4.6) and v = y - 75

18. If $\bar{x}$ = 30, $\bar{y}$ = 50, r = 0.8 and the standard deviations of X and Y are 2 and 5 respectively obtain the regression line of Y on X.

19. If the regression line of Y on X is $\hat{y}$ = 11 + 3x and $S_x : S_y$ = 3 : 10, find the co-efficient of determination.

20. If $\bar{x} = 5, \bar{y} = 11$ and $b = 1.2$, obtain the regression line of Y on X.

21. If $\bar{x} = 60, \bar{y} = 75$ and $s_x^2 : \text{Cov}(x, y) = 5 : 3$, obtain the regression line of Y on X and estimate y for $X = 65$ from it.

*** Answer The Following Questions as Directed.** **[28]**

22. The information of price (in ₹) of a ballpen and the supply of ballpen (in units) at the end of each month of a year for a company making ball pen is given below. Estimate the supply of ballpen when its price is ₹ 40.

Detail	Price (x)	Supply (y)
Average	30	500
Variance	25	10,000
$r = 0.8$		

23. The electricity is generated by windmill manufactured by a company. The following information is obtained by recording five observations regarding the velocity of wind (km per hour) and generation of electricity (in Watts) by a unit of the company.
Velocity of Wind = X km per hour
Electricity Generation = Y Watts
$\bar{x} = 20, \bar{y} = 186, \Sigma xy = 23200, s_x^2 = 50$
Obtain the regression line of electricity generation (Y) on velocity of wind (X). Estimate the electricity generation if the velocity of wind is 25 km per hour.

24. Six pairs of father-son are selected in a sample of an experiment to know the relation between the heights of fathers in cm (X) and the heights of their adult sons in em (Y).
The following results are obtained from it.
$\Sigma x = 1020, \Sigma y = 990, \Sigma(x - 170)^2 = 60, \Sigma(y - 165)^2 = 105$
$\Sigma(x - 170)(y - 165) = 45$
Obtain the regression line of the heights of sons (Y) on the heights of fathers (X). Also verify the reliability of the regression model.

25. (i) If the regression line is $\hat{y} = \frac{x}{2} + 5$ and $s_y : s_x = 5 : 8$, find the coefficient of determination.

(ii) If the regression line of Y on X is $4x + 5y - 65 = 0$, find the value of regression coefficient b.

26. The following information is obtained to study the relationship between average rainfall (in cm) and the yield of maize (in quintal per hectare) in different talukaa of Gujarat:

Particulars	Rainfall (cm) x	Yield of Maize (Quintal per Hectare) y
Mean	82	180
Variance	64	225
Correlation coefficient = 0.82		

Estimate the yield of maize when the rainfall is 60 cm.

27. The following results are obtained to study the relation between the price of battery (cell) of wrist watch in rupees (X) and its supply in hundred units (Y) :
n = 10, $\Sigma x = 130$, $\Sigma y = 220$, $\Sigma x^2 = 2288$ and $\Sigma xy = 3467$
Obtain the regression line of Y on X and estimate the supply when price is ₹ 16.

28. The information regarding maximum temperature (X) and sale of ice cream (Y) of six different days in summer for a city is given below : Maximum temperature = X (in celsius). Sale of ice cream = Y (in lakh ₹) $\bar{x} = 40$, $\bar{y} = 1.2$, $\Sigma xy = 306$, Sx2 = 20 Obtain the regression line of sale of ice cream on maximum temperature. Estimate the sale of ice cream if the maximum temperature on a day is 42 Celsius.

*** Calculate The Following Sums In Detail.** **[15]**

29. The information regarding the experience (In years) of eight workers on a machine and their performance ratings based on the non-defective units they manufactured in every 100 units is as follows :

Experience of worker (years)	5	12	15	8	20	18	22	25
Performance rating	80	82	85	81	90	90	95	97

Obtain the regression line of the performance rating on the experience and estimate the performance rating if a worker has an experience of 17 years.

30. Obtain the regression line of Y on X from the following data and estimate Y for X = 30.
n = 10, x = 250, y = 300, xy = 7900, $x^2 = 6500$.

31. The following results are obtained from the information of average rain and yield of a crop per acre in the last ten years of an arid region :

Particulars	Rainfall (cm)	Yield of crop (kg)
Mean	18	970
Standard Deviation	2	38
Correlation Coefficient = 0.6		

Estimate the yield of the crop if it rains 20 cms.

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