# Question Bank in Correlation, Regression

## 5 marks Questions

1. The equations of regression are $2x + 3y + 8 = 0$ and $x + 2y - 5 = 0$. Find the means of x and y and the coefficients of lines of regression.

2. Find the rank correlation coefficient for the following data:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Y: | 13 | 14 | 12 | 18 | 23 | 17 | 15 | 16 | 21 |

3. Calculate the Coefficient of Correlation between $X$ and $Y$ :

| | | | | | |
|---|---|---|---|---|---|
| X: | 3 | 5 | 4 | 6 | 2 |
| Y: | 3 | 4 | 5 | 2 | 6 |

4. Calculate the Spearman's rank correlation coefficient for the following data: [5]

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 85 | 74 | 85 | 50 | 65 | 78 | 74 | 60 | 74 | 90 |
| Y | 78 | 91 | 78 | 58 | 60 | 72 | 80 | 55 | 68 | 70 |

5. Calculate the Spearman's rank correlation coefficient for the following data:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 32 | 55 | 49 | 60 | 43 | 37 | 43 | 49 | 10 | 20 |
| Y | 40 | 30 | 70 | 20 | 30 | 50 | 72 | 60 | 45 | 25 |

## 6 marks Questions

1. Obtain the Spearman's rank correlation coefficient for the following data

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X: | 32 | 55 | 49 | 60 | 43 | 37 | 43 | 49 | 10 | 20 |
| Y: | 40 | 30 | 70 | 20 | 30 | 50 | 72 | 60 | 45 | 25 |

2. Ten students get the following marks in Mathematics and Statistics.:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
| Y | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |

Calculate the coefficient of correlation.

3. Calculate the Karl Pearson's Coefficient of Correlation for the following data:

| | | | | | |
|---|---|---|---|---|---|
| Price (in \$): | 5 | 6 | 3 | 4 | 3 |
| Demand (in units): | 10 | 10 | 12 | 11 | 12 |

4. Fit a straight line of the form $y = a + bx$ to the following data:

| | | | | | | |
|---|---|---|---|---|---|---|
| X: | 1 | 3 | 5 | 7 | 8 | 10 |
| Y: | 8 | 12 | 15 | 17 | 18 | 20 |

5. Obtain the Spearman's rank correlation coefficient for the following data.

| | | | | | |
|---|---|---|---|---|---|
| X: | 12 | 17 | 22 | 27 | 32 |
| Y: | 113 | 119 | 117 | 115 | 121 |

6. Ten students get the following marks in Mathematics and Statistics.:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
| Y | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |

Calculate the coefficient of correlation.

7. Find the Karl Pearson's Correlation Coefficient for the following data:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 71 |
| Y | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 |

8. Fit a straight line to the following data

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 1 | 1.8 | 3.3 | 4.5 | 6.3 |

9. Consider the equations of regression lines $5x - y = 22$ and $64x - 45y = 24$. Find $\bar{x}, \bar{y}$ and correlation coefficient $r$.

10. Find Spearman's rank correlation coefficient for the data below:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X: | 32 | 55 | 49 | 60 | 43 | 37 | 43 | 49 | 10 | 20 |
| Y: | 40 | 30 | 70 | 20 | 30 | 50 | 72 | 60 | 45 | 25 |

11. Obtain the coefficients of regression and hence obtain equations of lines of regression for the following data: [6]

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X: | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
| Y: | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |

**8 marks Questions**

1. Obtain the equations of lines of regression for the following data:
Also obtain the estimate of $X$ for $Y = 70$.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X: | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 |
| Y: | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 |

2. Find the lines of regression for the following data:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
| Y | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |

3. The following table gives data concerning the savings bank deposit (X) in lakhs and the number of strikes and lockouts (Y) over a period of 7 years. Calculate the Correlation coefficient and the regression lines: (Dec 2023)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| X | 51 | 54 | 55 | 59 | 65 | 60 | 70 |
| Y | 38 | 44 | 33 | 36 | 33 | 23 | 10 |

4. Obtain the lines of regression for the following data

| x | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|
| y | 11 | 14 | 14 | 15 | 12 | 17 | 16 |

5. The regression lines of samples are $6y - 5x = 90$ and $15x - 8y = 130$, and $\sigma_x = 4$
Find (i) sample means $\bar{x}$, $\bar{y}$, (ii) Coefficient of correlation between $x$ and $y$, (iii) $\sigma_y$. (iv) Also estimate $y$ at $x = 10$

6. Fit a parabola $x = a + by + cy^2$ for the following data:

| X: | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Y: | 10 | 12 | 15 | 14 | 15 |

7. Fit a second degree parabola $y = a + bx + cx^2$ to the following data :

| x | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|
| y | 12 | 14 | 26 | 42 | 40 | 50 | 52 | 53 |

(Hint: Let us consider $X = x - 1977$. Then we will have the following table:

| X= x-1977 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| y | 12 | 14 | 26 | 42 | 40 | 50 | 52 | 53 |

)

8. Fit a parabola $y = a + bx + cx^2$ to the following data and estimate $y$ when $x = 10$:

| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| y | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |

9. Given the regression lines $6y = 5x + 90$, $15x = 8y + 130$ and $\sigma_x^2 = 16$, find
(i) $\bar{x}, \bar{y}$ (ii) $r$(iii) $\sigma_y^2$