**1.** Solve the following LPP by graphical method:

    Min Z = 3x + 2y

     Subject to  : 5x + 2y ≥ 10

          x + 4y ≥ 12

          x ≥ 0, $y$ ≥ 0.

**2.** Solve the following LPP by graphical method:

    Max z= 9x + 13y

    Subject to  :  2x + 3y ≤ 18

          2x + y ≤ 12

          x ≥ 0, $y$ ≥ 0.

**3.** A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grains of codeine. Size B contains 1 grains of aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by user that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate effect.

 It is required to determine the least number of pills a patient should take a get immediate relief. Formulate the LPP.

**4.** A manufacturer has three machines A, B, C with which he produces three different articles P, Q, R. The different machine times required per articles, the amount of time available in any week on each machine and the machine and the estimated profits per article are furnished in the following table:

| Machine | Machine time in hours | | | Profit / items |
|---|---|---|---|---|
| | A | B | C | |
| P | 8 | 4 | 2 | 20 |
| Q | 2 | 3 | 0 | 6 |
| R | 3 | 0 | 1 | 8 |
| Available time | 250 | 150 | 50 | - |

Formulate the LPP.

**5.** Fit a straight line for the following data.

| X | : | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| Y | : | 10 | 6 | 14 | 24 | 36 | 50 |

**6.** Compute Karl Pearson coefficient of correlation for the following data

| X | : | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|---|
| Y | : | 20 | 16 | 14 | 10 | 8 |

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**7.** Obtained rank correlation coefficient for the following data:

| X | : | 60 | 62 | 64 | 66 | 68 | 70 | 68 |
|---|---|----|----|----|----|----|----|----|
| Y | : | 92 | 83 | 101 | 110 | 128 | 83 | 119 |

**8.** The following table shows the marks obtained by the eight students in Accountancy and statistics, calculate Spearman's rank correlation coefficient.

| Accountancy | : | 45 | 70 | 65 | 30 | 90 | 40 | 50 | 70 |
|---|---|----|----|----|----|----|----|----|----|
| Statistics | : | 35 | 90 | 70 | 40 | 95 | 40 | 60 | 40 |

**9.** The Equation of the two lines of regression are $3x + 2y - 26 = 0$ and $6x + 3y - 30 = 0$

Find i) the mean of x and y          ii) coefficient of correlation between x and y.

**10.** In a partially destroyed laboratory record of analysis of correlation data the following results are legible. Equation of the lines of regression $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$,
Find i) Find regression line x on y    ii)   the mean of x and y
iii)   coefficient of correlation between x and y.

**11.** The following result were obtained in the analysis of data on yield of dry bark in ounces (y) and age in years (x) of 200 cinchona plants.

| | | |
|---|---|---|
| Averages | 9.2 | 16.5 |
| Standard deviation | 2.1 | 4.2 |

Coefficient of correlation between them is 0.84
Construct the two regression lines and estimate yield of dry dark of a plant of age 8 years.

**12.** For the following data compute: i) Cov (x,y)    ii) Var (y)       iii) regression coefficient x on y.

| x | : | 10 | 12 | 18 | 15 | 40 |
|---|---|----|----|----|----|----|
| y | : | 12 | 18 | 20 | 25 | 30 |

**13.** Fit a second degree parabolic curve for the following data:

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Y | 1 | 1.2 | 1.8 | 2.5 | 3.6 | 4.7 | 6.6 |

**14.** Fit a regression plane by using  multiple regression  to fit the following data:

| X | : | 3 | 10 | 15 | 18 | 20 | 25 | 27 |
|---|---|---|----|----|----|----|----|----|
| Y | : | 2 | 4 | 6 | 3 | 5 | 9 | 8 |
| Z | : | 1 | 2 | 3 | 1.5 | 2.5 | 4.5 | 4 |

**15.** Use multiple regression to fit the following data:

| $X_1$ | : | 0 | 2 | 2.5 | 1 | 4 | 7 |
|---|---|---|---|-----|---|---|---|
| $X_2$ | : | 0 | 1 | 2 | 3 | 6 | 2 |
| Y | : | 5 | 10 | 9 | 0 | 3 | 27 |

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