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93) optin 2:

a)

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 2 & 7 \\ 3 & 5 & 8 \end{bmatrix} \xrightarrow{P_{13}} \begin{bmatrix} 3 & 5 & 8 \\ 2 & 2 & 7 \\ 1 & 1 & 2 \end{bmatrix} \xrightarrow{\begin{matrix} -\frac{2}{3} R_1 \rightarrow R_2 \\ -\frac{1}{3} R_1 \rightarrow R_3 \end{matrix}} \begin{bmatrix} 3 & 5 & 8 \\ 0 & -4/3 & 5/3 \\ 0 & -2/3 & -2/3 \end{bmatrix}$$

P

$$L = \begin{bmatrix} 1 & 0 & 0 \\ 2/3 & 1 & 0 \\ 1/3 & 1/2 & 1 \end{bmatrix}$$

$$P = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 5 & 8 \\ 0 & -4/3 & 5/3 \\ 0 & 0 & -9/6 \end{bmatrix} = U$$

$$-\frac{1}{2} R_2 \rightarrow R_3$$

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Q3) option 2

b)

$$PA = LU$$
$$PAx = LUx$$
$$Pb = \underbrace{LUx}_y$$
$$= Ly$$

$$Pb = \begin{bmatrix} 8 \\ 6 \\ 5 \end{bmatrix}$$

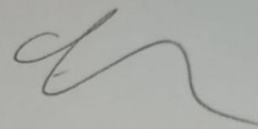
$$\begin{bmatrix} 1 & 0 & 0 \\ 2/3 & 1 & 0 \\ 1/3 & 1/2 & 1 \end{bmatrix} \begin{bmatrix} y_{11} \\ y_{21} \\ y_{31} \end{bmatrix} = \begin{bmatrix} 8 \\ 6 \\ 5 \end{bmatrix}$$

$$y = \begin{bmatrix} 8 \\ 2/3 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 5 & 8 \\ 0 & -4/3 & 5/3 \\ 0 & 0 & -5/6 \end{bmatrix} \begin{bmatrix} x_{11} \\ x_{21} \\ x_{31} \end{bmatrix} = \begin{bmatrix} 8 \\ 2/3 \\ 2 \end{bmatrix}$$

$$x = \begin{bmatrix} 149/10 \\ -7/2 \\ -12/5 \end{bmatrix}$$

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Q4) option 2 :

$$\min \sum_{i=1}^4 (y_i - \hat{y}_i)^2$$

$$\downarrow \sum_{i=1}^4 (y_i - ax - b)^2$$

$$\downarrow \frac{d \sum_{i=1}^4 (y_i - ax - b)^2}{da} = -2 \sum_{i=1}^4 x (y_i - ax - b) = 0$$

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$$\textcircled{1} = \sum_{i=1}^4 xy_i - ax^2 - bx = 0$$

$$\frac{d \sum_{i=1}^4 (y_i - ax - b)^2}{db} = -2 \sum_{i=1}^4 (y_i - ax - b) = 0$$

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$$\textcircled{2} = \sum_{i=1}^4 y_i - ax - b = 0$$

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from ①,  $\sum xy = \sum ax^2 + \sum bx$

from ②,  $\sum y = \sum ax + \sum b$

matrix :

$$\begin{bmatrix} \sum x^2 & \sum x \\ \sum x & 4 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} \sum xy \\ \sum y \end{bmatrix}$$

$$\begin{bmatrix} 59 & 5 \\ 5 & 4 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} -21 \\ 59 \end{bmatrix}$$

$$a = \frac{-379}{211}$$
$$b = \frac{3596}{211}$$