(2)

$$A = \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

① $A^T = \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$

$$tr(A^T) = 5 + 8 + (-4) = 9$$

$$tr_a\left(A^T\right) = 5 + 8 + (-4) = 9$$

$$A^2 + 2A + tr_a\left(A^T\right)$$

$$= \begin{bmatrix} 5 & -7 & -1 \\ -7 & 8 & 2 \\ -1 & 2 & -4 \end{bmatrix} \begin{bmatrix} 5 & -7 & -1 \\ -7 & 8 & 2 \\ -1 & 2 & -4 \end{bmatrix} + 2\begin{bmatrix} 5 & -7 & -1 \\ -7 & 8 & 2 \\ -1 & 2 & -4 \end{bmatrix} + 9$$

$$= \begin{bmatrix} 25+49+1 & -35-56+2 & 5-14-4 \\ -35-56+2 & 49+64+4 & -7+16-8 \\ 5-14-4 & -7+16-8 & 1+4+16 \end{bmatrix}$$

$$+ \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix} + 9I$$

$$= \begin{bmatrix} 75 & -89 & -13 \\ -89 & 117 & 1 \\ -13 & 1 & 21 \end{bmatrix} + \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix}$$

$$+ 9 \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 85 & -103 & -11 \\ -103 & 133 & 5 \\ -11 & 5 & 13 \end{bmatrix} + \begin{bmatrix} 9 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 9 \end{bmatrix}$$

$$= \begin{bmatrix} 94 & -103 & -11 \\ -103 & 142 & 5 \\ -11 & 5 & 22 \end{bmatrix} \quad \underline{Ans}$$

(1)

$$x_1 + 2x_2 - 3x_3 + 4x_4 = 2$$

$$2x_1 + 5x_2 - 2x_3 + x_4 = 1$$

$$5x_1 + 12x_2 - 7x_3 + 6x_4 = 3$$

Augmented matrix:

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ 5 & 12 & -7 & 6 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ 5 & 12 & -7 & 6 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ 5 & 12 & -7 & 6 & 3 \end{bmatrix}$$

= multiplying first with -2 and -5 and adding to the second row and third row

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 2 & 8 & -14 & -7 \end{bmatrix}$$

= multiplying $\dot{a}$ second row with -2 and adding with third row we get

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 0 & 0 & 0 & -1 \end{bmatrix}$$

= multiplying to second now with -2 and adding with third row we get

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 0 & 0 & 0 & -1 \end{bmatrix}$$

= This Gauss elimination form GJ is

~~also contradictory~~ | multiplying third row

with -1

2

$$= \begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \text{multiplying} \\ \text{-3nd row} \\ \text{with } -1 \end{bmatrix}$$

= multiplying 2nd row with -2 and

adding with first row

$$= \begin{bmatrix} 1 & 0 & -11 & 18 & 8 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

adding with first row

$$\begin{bmatrix} 1 & 0 & -11 & 18 & 8 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -11 & 18 & 0 \\ 0 & 1 & 4 & -7 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

This Gauss Jordan elimination form

∴ No answer

$\therefore$ This system has no solution an

$$O = 7 \quad \text{it. is contradictory}$$