

Q.13

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1.) 
$$\begin{aligned} x_1 + 2x_2 - 3x_3 + 4x_4 &= 2 \\ 2x_1 + 5x_2 - 2x_3 + x_4 &= 1 \\ 5x_1 + 12x_2 - 7x_3 + 6x_4 &= 3 \end{aligned}$$

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

$$\begin{array}{ccccc} 1 & 2 & -3 & 4 & 2 \\ 0 & 5 & -2 & 1 & 1 \\ 0 & 12 & & & \end{array}$$

$$\begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 2 & 22 & 14 & -7 \end{bmatrix}$$

Add -2 times first row to the second row

Add -5 times first row to the 3rd row.

$$\begin{bmatrix} 1 & 0 & 18 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 38 & 28 & 7 \end{bmatrix}$$

~~Add -2 times the 2nd row to the~~

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$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 38 & 28 & 7 \end{bmatrix}$$

Add -2 times the second row to the first row

Add -2 times the 2nd row to the 3rd row.

$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 1 & \frac{14}{19} & \frac{7}{38} \end{bmatrix}$$

Multiply  $\frac{1}{38}$  to the 3rd row.

$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 1 & \frac{14}{19} & \frac{7}{38} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 1 & \frac{14}{19} & \frac{7}{38} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 1 & \frac{14}{19} & \frac{7}{38} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 13 & 18 & 16 \\ 0 & 1 & -8 & -7 & -7 \\ 0 & 0 & 1 & \frac{14}{19} & \frac{7}{38} \end{bmatrix}$$

$$2. \quad A^2 + 2A + 4\text{tr}(A^T)$$

$$\begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}^2 + 2 \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & 4 \end{bmatrix} + 4\text{tr}(A^T)$$

$$\begin{bmatrix} 25 + 49 & 1 & \\ 49 & 64 & 4 \\ 1 & 4 & 16 \end{bmatrix} + \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & 8 \end{bmatrix} + 9$$

$$\begin{bmatrix} 35 & 35 & 3 \\ 35 & 80 & 8 \\ 3 & 8 & 24 \end{bmatrix} + 9$$