

Name: Rafsina Osman (Riya)  
ID: 1611446042

Quiz #1  
Date: 12 / 11 / 20

### Ans to the Ques No - 1

1.

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

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

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

The augmented matrix

$$\left[ \begin{array}{cccc|c} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ 5 & 12 & -7 & 6 & 3 \end{array} \right]$$

adding -2 to the first row  
obtain second

adding -5 to the first row  
obtain third

$$\left[ \begin{array}{cccc|c} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ 0 & 2 & 8 & -14 & -7 \end{array} \right]$$

add -2 times to the 2nd row  
obtain 3rd row

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

multiply the third row by -1

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

add 3 times to the third

row → obtain 2nd odd-2

line to the third row &  
obtain 157

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

add  $-2 \times \text{row 2}$

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

$$x_1 = -11x_3 - 18x_4$$

$$\text{let } x_3 = s, x_4 = t$$

$$x_2 = 4x_3 - 7x_4$$

$$x_2 = 11s - 18t$$

$$x_2 = 4s - 7t$$

$$x_3 = s, x_4 = t$$

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

Here,

$$A^2 = \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & 8 \end{bmatrix}$$

$$2A = \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix}$$

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

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$$A^2 + 2A + A^T$$

$$= \begin{pmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{pmatrix} + \begin{pmatrix} 16 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{pmatrix} + \begin{pmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & 4 \end{pmatrix}$$

$$= \begin{pmatrix} 21 & -35 & 5 \\ -35 & 26 & 10 \\ 5 & 10 & -12 \end{pmatrix}$$