Monday, 7 June, 2021 10:35 PM

$x_1 - x_2 = 2$

$2x_1 + 2x_2 + 3x_3 = 1$

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

$$\Rightarrow \begin{bmatrix} 1 & -1 & 0 \\ 2 & 2 & 3 \\ -1 & 3 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$$

$$L = \begin{bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{bmatrix}$$

$$U = \begin{bmatrix} d & e & f \\ 0 & g & h \\ 0 & 0 & i \end{bmatrix}$$

$$LU = \begin{bmatrix} d & e & f \\ ad & ae+g & af+h \\ db & eb+gc & fb+hc+i \end{bmatrix}$$

$d = 1 \quad e = -1 \quad f = 0$

$ad = 2$

$a = 2$

$(2)(-1)$

$ae + g = 2$

$g = 4$

$af + h = 3$

$0 + h = 3$

$h = 3$

$db = -1$

$b = -1$

$eb + gc = 3$

$-1(-1) + 4c = 3$

$c = 2/4$

$c = 1/2$

$fb + hc + i = 2$

$0 + 3(1/2) + i = 2$

$i = 2 - 3/2$

$i = 1/2$ #

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

$$U = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 4 & 3 \\ 0 & 0 & 1/2 \end{bmatrix}$$

$LY = B$

$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 1/2 & 1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix}$$

$y_1 = 2$

$2y_1 + y_2 = -1$

$4 + y_2 = -1$

$y_2 = -5$

$-y_1 + 1/2\, y_2 + y_3 = 4$

$-2 \quad -5/2 + y_3 = 4$

$y_3 = 4 + 2 + 5/2$

$y_3 = 17/2$

$$UX = Y \quad = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 4 & 3 \\ 0 & 0 & 1/2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2 \\ -5 \\ 17/2 \end{bmatrix}$$

$x_1 - x_2 = 2$

$4x_2 + 3x_3 = -5$

$\frac{1}{2} x_3 = 17/2$

$x_3 = 17$ ✗

$4x_2 + 3(17) = -5$

$x_2 = \frac{-5 - 3(17)}{4}$

$x_2 = -14$ ✗

$x_1 - (-14) = 2$

$x_1 = 16$ ✗