

$$L = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 3/2 & 1 \end{pmatrix} \quad \bar{U} = \begin{pmatrix} 1 & 1 & 2 \\ 0 & 2 & -7 \\ 0 & 0 & -3/2 \end{pmatrix}$$

$$Y = \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}, \quad L \cdot Y = B$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 3/2 & 1 \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} 9 \\ 1 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} y_1 \\ 2y_1 + y_2 \\ 3y_1 + 3/2y_2 + y_3 \end{pmatrix} = \begin{pmatrix} 9 \\ 1 \\ 0 \end{pmatrix}$$

$$y_1 = 9, \quad y_2 = -17, \quad y_3 = -3/2$$

$$Y = \bar{U} \cdot X$$

$$\begin{pmatrix} 9 \\ -17 \\ -3/2 \end{pmatrix} = \begin{pmatrix} 1 & 1 & 2 \\ 0 & 2 & -7 \\ 0 & 0 & -3/2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

$$\Rightarrow x = 1, \quad y = 2, \quad z = 3$$

$$S = \{(1, 2, 3)\}$$

$$Y = \bar{U} \cdot X$$

$$\begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix} = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$$

$$\begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix} = \begin{pmatrix} x_1 + x_2 \\ x_2 + x_3 \\ 2x_3 \end{pmatrix}$$

$$\begin{cases} x_3 = 5/2 \\ x_2 = 1/2 \\ x_1 = -3/2 \end{cases} \Rightarrow S = \{-3/2, 1/2, 5/2\}$$

أوجد مجموعة حلول المعادلات التالية:

$$\begin{cases} x + y + 2z = 9 \\ 2x + 4y - 3z = 1 \\ 3x + 6y - 5z = 0 \end{cases}$$

$$A = \begin{pmatrix} 1 & 1 & 2 \\ 2 & 4 & -3 \\ 3 & 6 & -5 \end{pmatrix}$$

$$L = \begin{pmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & d \end{pmatrix}, \quad \bar{U} = \begin{pmatrix} d & e & f \\ 0 & g & h \\ 0 & 0 & m \end{pmatrix}$$

أوجد كل مجموعة حلول المعادلات التالية:

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

$$x_1 - x_2 - x_3 + 2x_4 = 0$$

$$4x_1 + 4x_2 + x_3 + x_4 = 11$$

$$2x_1 + x_2 + 2x_3 + 2x_4 = 2$$

$$A = L \cdot \bar{U}$$

$$\begin{pmatrix} 1 & 1 & 2 \\ 2 & 4 & -3 \\ 3 & 6 & -5 \end{pmatrix} = \begin{pmatrix} d & e & f \\ a \cdot d & a \cdot e + g & a \cdot f + h \\ b \cdot d & b \cdot e + g \cdot c & b \cdot f + c \cdot h + m \end{pmatrix}$$

$$\begin{cases} d = 1, \quad e = 1, \quad f = 2, \quad a = 2, \quad g = 2 \\ h = 7, \quad b = 3, \quad c = 3/2, \quad m = -1/2 \end{cases}$$