

week 2023-04-12

연습문제 4.1 part 3.

10.

$$(1) \left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 3 \\ 0 & 1 & 1 & 1 \end{array} \right]$$

$$R_2 - (-1) + R_1 \Rightarrow R_2$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & -3 \\ 0 & 1 & 1 & 1 \end{array} \right]$$

$$R_3 \times (-1) + R_2 \Rightarrow R_3$$

$$R_2 \Leftrightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & -3 \\ 0 & 0 & 1 & 1 \end{array} \right]$$

$$x_3 = 1, x_2 = -4, x_1 = 3$$

$$(2) \left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 2 & 0 \end{array} \right]$$

$$R_2(-1) + R_1 \Rightarrow R_2$$

$$R_3(-1) + R_1 \Rightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 1 & 1 & 0 \end{array} \right]$$

$$R_3 \times (-1) + R_2 \Rightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 1 & 0 \end{array} \right]$$

$$x_1, x_2, x_3 = 0$$

11.

$$R_1 \Leftrightarrow R_2$$

$$\left[\begin{array}{ccc|c} 2 & 6 & 1 & 7 \\ 1 & 2 & -1 & -1 \\ 5 & 7 & -4 & 9 \end{array} \right]$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & -1 \\ 2 & 6 & 1 & 7 \\ 5 & 7 & -4 & 9 \end{array} \right]$$

$$R_1 \times (-2) + R_2 \Rightarrow R_2$$

$$R_1 \times (-5) + R_3 \Rightarrow R_3$$

$$\frac{27}{55}$$

$$\frac{27}{2} + 14$$

$$\frac{9}{2} + 1$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & -1 \\ 0 & 2 & 3 & 9 \\ 0 & 3 & 1 & 14 \end{array} \right]$$

$$R_2 \times \frac{3}{2} + R_3 \Rightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & -1 \\ 0 & 2 & 3 & 9 \\ 0 & 0 & \frac{11}{2} & \frac{55}{2} \end{array} \right]$$

$$x_3 = 5, x_2 = -3, x_1 = 10$$

19.

$$B = \begin{bmatrix} 1 & 3 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix}$$

$$R_2 \times (-3) + R_1 \rightarrow R_1$$

$$\begin{bmatrix} -5 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} \leftarrow L$$

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

$$R_2 \times (-1) + R_1 \rightarrow R_1$$

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

$$R_2 \times (-1) + R_1 \rightarrow R_1$$

$$R_2 \times (-1) + R_1 \rightarrow R_1$$

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

$$R_2 \times (3) + R_1 \rightarrow R_1$$

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

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

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \leftarrow U$$

$$R_3 \times (-1) + R_1 \rightarrow R_1$$

$$R_3 \times (-1) + R_1 \rightarrow R_1$$

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

20.

$$R_1 \times (-2) + R_2 \rightarrow R_2$$

$$R_1 \times (-1) + R_3 \rightarrow R_3$$

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 1 & 2 \\ 2 & 3 & 4 & 3 & 3 & 5 \\ 1 & 0 & 1 & 5 & 5 & 2 \end{array} \right]$$

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 1 & 2 \\ 0 & -1 & -2 & 1 & 1 & 1 \\ 0 & -2 & -2 & 4 & 0 & 1 \end{array} \right]$$

$$R_2 \times (-2) + R_3 \rightarrow R_3$$

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 1 & 2 \\ 0 & -1 & -2 & 1 & 1 & 1 \\ 0 & 0 & 2 & 2 & 2 & -2 \end{array} \right]$$

$$(1) x_3 = 1, x_2 = -3, x_1 = 4$$

$$(2) x_3 = -1, x_2 = 1, x_1 = 3$$

22.

$$R_2 \times (-3) + R_1 \rightarrow R_1$$

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

$$\begin{bmatrix} -5 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix}$$

L

U

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad R_2 \times 3 + R_1 \rightarrow R_1$$

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} = \begin{bmatrix} -5 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

U

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -5 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$$

U

L

X

b

L2=y

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

$$\begin{aligned} y_1 &= \frac{1}{5} \\ y_2 &= \frac{2}{5} \\ y_3 &= \frac{3}{5} \end{aligned} \quad \begin{aligned} 2y_1 + y_2 &= 2 \\ \frac{2}{5} + \frac{2}{5} &= \frac{4}{5} \end{aligned}$$

UX=Y

$$\begin{aligned} x_1 &= 1 \\ x_2 &= 0 \\ x_3 &= -3 \end{aligned}$$

$$3y_1 + 4$$

$$\frac{3}{5} + \frac{32}{5}$$

$$\frac{33}{5}$$

$$-5y_1 = 1$$

$$2y_1 + y_2 = 2$$

$$3y_1 + 4y_2 + y_3 = 0$$

$$y_1 = -\frac{1}{5}$$

$$y_2 = \frac{2}{5}$$

$$y_3 = -\frac{9}{5}$$

$$\begin{bmatrix} -5 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -5 \\ 2 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ -5 \end{bmatrix}$$

UX

$$\frac{26}{5}$$

$$\begin{bmatrix} -\frac{3}{5} & \frac{12}{5} & 9 \end{bmatrix}$$

$$y_2 = \frac{33}{5} - \frac{2}{5} + y_2 = \frac{10}{5} \quad y_2 = 2$$

$$y_3 = 0$$