· 식 (3.2)에 뒤따르는 설명 (3.2)

$$
A = \begin{pmatrix}
\blacksquare^2 & \blacksquare^2 & \blacksquare^2 & \blacksquare^2 & \blacksquare^2 \\
\blacksquare^2 & \blacksquare^2+\triangle\nabla & \blacksquare^2+\triangle\nabla & \blacksquare^2+\triangle\nabla & \blacksquare^2+\triangle\nabla \\
\blacksquare^2 & '' & & & \\
\blacksquare^2 & '' & & & \\
\blacksquare^2 & '' & & &
\end{pmatrix}
\begin{array}{l} \Rightarrow 1\text{행} \\ \Rightarrow 2\text{행} \\ \vdots \\ \\ \Rightarrow 5\text{행} \end{array}
$$

$\Uparrow$ 1열 $\Uparrow$ 2열 … $\Uparrow$ 5열

* $10\triangle \cdot \frac{1}{10}\nabla$ 해도 결과 동일

· 226p 3.3.2

다양한 $\underset{\sim}{b}$에 대해 반복하는 연립일차방정식 ~

ex) $\underset{\sim}{b} = \begin{pmatrix}1\\2\\3\end{pmatrix}, \begin{pmatrix}4\\5\\6\end{pmatrix}, \begin{pmatrix}7\\8\\9\end{pmatrix}, \cdots$

$A = \begin{pmatrix}1 & 0 & 0.5\\ 2 & 3 & 4\\ 0 & -1 & -3\end{pmatrix}$

$$\Rightarrow \quad A\underset{\sim}{x} = \underset{\sim}{b}$$

$$\begin{cases} x_1 + 0x_2 + 0.5x_3 = \\ 2x_1 + 3x_2 + 4x_3 = \\ 0x_1 - x_2 - 3x_3 = \end{cases} \boxed{\begin{matrix}1\\2\\3\end{matrix}} \Leftarrow \begin{pmatrix}4\\5\\6\end{pmatrix}, \begin{pmatrix}7\\8\\9\end{pmatrix}, \cdots \text{ 등으로 바뀔 때}$$

x_1, x_2, x_3

· 226p 3.3.3

모양 바꾸기 !

ex)
$$A = \begin{pmatrix}2 & 1 & 1\\ 4 & -6 & 0\\ -2 & 7 & 2\end{pmatrix} = \begin{pmatrix}1 & 0 & 0\\ \blacksquare & 1 & 0\\ \blacksquare & \blacksquare & 1\end{pmatrix}\begin{pmatrix}\blacksquare & \blacksquare & \blacksquare\\ 0 & \blacksquare & \blacksquare\\ 0 & 0 & \blacksquare\end{pmatrix} ?$$

* 구해야 할 게 많은 행/열부터

$\Rightarrow$ 1행 : 2, 1, 1

$$\Rightarrow \begin{pmatrix}1 & 0 & 0\\ \blacksquare & 1 & 0\\ \blacksquare & \blacksquare & 1\end{pmatrix}\begin{pmatrix}2 & 1 & 1\\ 0 & \blacksquare & \blacksquare\\ 0 & 0 & \blacksquare\end{pmatrix}$$

?

$\because 2\blacksquare + 0 + 0 = -2$

$\Rightarrow$ 1열 : $(1, \underset{\sim}{2}, \overset{\sim}{-1})$

$\because 2\blacksquare + 0 + 0 = 4$

$$\Rightarrow \begin{pmatrix}1 & 0 & 0\\ 2 & 1 & 0\\ -1 & \blacksquare & 1\end{pmatrix}\begin{pmatrix}2 & 1 & 1\\ 0 & \blacksquare & \blacksquare\\ 0 & 0 & \blacksquare\end{pmatrix} ?$$

$\because 2\cdot 1 + 1\cdot\blacksquare + 0 = 0$

$\Rightarrow$ 2행 : $(0, \underset{\sim}{-8}, \overset{\sim}{-2})$

$\because 2\cdot 1 + 1\cdot\blacksquare + 0 = -6$

$\vdots$

$$\Rightarrow \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & \overset{?}{\blacksquare} & 1 \end{pmatrix} \left(\begin{array}{c|c|c} 2 & 1 & 1 \\ 0 & -8 & -2 \\ 0 & 0 & \blacksquare \end{array}\right)$$

$\Rightarrow$ 2열 : $(-1, \underset{\sim\sim}{-1}, 1)$

$\because -1 \cdot 1 - 8 \cdot \blacksquare + 0 = 7 \quad (\rightarrow 8\blacksquare = -1-7)$

$$\Rightarrow \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & -1 & 1 \end{pmatrix} \left(\begin{array}{c|c|c} 2 & 1 & 1 \\ 0 & -8 & -2 \\ 0 & 0 & \blacksquare \end{array}\right)^{?}$$

$\Rightarrow$ 3행 : $(0, 0, \underset{\sim\sim}{1})$ $\because -1 \cdot 1 + (-1)(-2) + 1 \cdot \blacksquare = 2$

·241p 이론

ex)

$$A_{3\times4} = \begin{pmatrix} 1 & 2 & -3 & 1 \\ 2 & 4 & 0 & 7 \\ -1 & 3 & 2 & 0 \end{pmatrix}, \quad s = \min(3, 4) = 3$$

$$L_{3\times3} = \Big(\underbrace{\begin{matrix} \circ \\ \circ \\ \circ \end{matrix}}_{\ell_1 \, (3\times \underset{m}{1})} \begin{matrix} \circ & \circ \\ \circ & \circ \\ \circ & \circ \end{matrix}\Big), \quad U_{3\times4} = \begin{pmatrix} \overbrace{\triangle \; \triangle \; \triangle \; \triangle}^{u_1^T \, (1\times \overset{n}{4})} \\ \triangle \; \triangle \; \triangle \; \triangle \\ \triangle \; \triangle \; \triangle \; \triangle \end{pmatrix}$$

$A = \ell_1 u_1^T + \cdots + \ell_3 u_3^T$ $\Rightarrow$ 모두 3×4 ($m\times n$ 행렬 합)

① 단계

$\ell_1 = \frac{1}{a_{11}} \begin{pmatrix} a_{11} \\ \vdots \\ a_{31} \end{pmatrix}$ $\longrightarrow$ ℓ_1의 1번째 원소, 즉, ℓ_{11}(대각원소) $= 1$로 만들어주려고 나눔

$u_1^T = (a_{11}, \cdots, a_{14})$

$\Rightarrow A - \ell_1 u_1^T$

$$\Rightarrow \begin{pmatrix} 1 & 2 & -3 & 1 \\ 2 & 4 & 0 & 7 \\ -1 & 3 & 2 & 0 \end{pmatrix} - \frac{1}{1} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \begin{pmatrix} 1 & 2 & -3 & 1 \end{pmatrix}$$

$$\Rightarrow \begin{pmatrix} 1 & 2 & -3 & 1 \\ 2 & 4 & 0 & 7 \\ -1 & 3 & 2 & 0 \end{pmatrix} - \begin{pmatrix} 1 & 2 & -3 & 1 \\ 2 & 4 & -6 & -2 \\ -1 & -2 & 3 & -1 \end{pmatrix}$$

$$\Rightarrow \left(\begin{array}{c|ccc} 0 & 0 & 0 & 0 \\ \hline 0 & 0 & 6 & 9 \\ 0 & 5 & -1 & 1 \end{array}\right) - A(2)$$

* 여기서 순서를 바꾸는데,
A, ℓ_1에 대응되는 행도 바꿔준다

· 242p P 원래 형태 : I_6

치환행렬 P를 벡터에 곱하면 벡터 성분 순서를 정렬 (재배열)

$$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}\begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \\ 3 \end{pmatrix}$$

· 246p 3.8.2 정렬해도 앞이 막힌 상황

ex) $A = \underset{\sim}{l_1}\underset{\sim}{u_1}^T + \underset{\sim}{l_2}\underset{\sim}{u_2}^T + \cdots + \underset{\sim}{l_s}\underset{\sim}{u_s}^T$ 진행 중

$$A - \underset{\sim}{l_1}\underset{\sim}{u_1}^T = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & * & * & * \\ 0 & 0 & * & * & * \\ 0 & 0 & * & * & * \end{pmatrix}$$

A(②)와 같은 경우