2015년 11월 3일 정세현

7.7

11. 행렬식의 계산.

$$\begin{bmatrix} 6 & -1 & 8 \\ 0 & -2 & 9 \\ 0 & 0 & -4 \end{bmatrix} = 6\begin{vmatrix} -2 & 9 \\ 0 & -4 \end{vmatrix} + 1\cdot\cancel{\begin{vmatrix} 0 & 9 \\ 0 & -4 \end{vmatrix}} + 8\cancel{\begin{vmatrix} 0 & -2 \\ 0 & 0 \end{vmatrix}} = 6\cdot 8 = 48.$$

13. → 삼각행렬로 만들어 보자.

$$\begin{bmatrix} 0 & 4 & -1 & 5 \\ -4 & 0 & 3 & -2 \\ 1 & -3 & 0 & 1 \\ -2 & 1 & 1 & -1 \end{bmatrix} = \begin{bmatrix} 1 & -3 & 0 & 1 \\ -4 & 0 & 3 & -2 \\ 0 & 4 & -1 & 5 \\ -2 & 1 & 1 & -1 \end{bmatrix} \begin{matrix} -① \\ -② \\ -③ \\ -④ \end{matrix} \quad \begin{matrix} ①\times 4 + ② \\ ①\times 2 + ④ \end{matrix} \Rightarrow \begin{bmatrix} 1 & -3 & 0 & 1 \\ 0 & -12 & 3 & 2 \\ 0 & 4 & -1 & 5 \\ 0 & 5 & 1 & 1 \end{bmatrix} \begin{matrix} -⑤ \\ -⑥ \\ -⑦ \\ -⑧ \end{matrix}$$

$$⑥ + ①\times 3 \Rightarrow \begin{bmatrix} 1 & -3 & 0 & 1 \\ 0 & 4 & -1 & 5 \\ 0 & 0 & -0.25 & 11.25 \\ 0 & 0 & 0 & 17 \end{bmatrix} = 1\times 4\times 0.25\times 17 = 17$$

7.8 가우스조단 법칙

3. $$\begin{bmatrix} 0 & -0.2 & 0.75 \\ 0.4 & 1 & 2 \\ 0 & 0 & 8 \end{bmatrix} + I = \begin{bmatrix} 0 & -0.2 & 0.75 & 1 & 0 & 0 \\ 0.4 & 1 & 2 & 0 & 1 & 0 \\ 0 & 0 & 8 & 0 & 0 & 1 \end{bmatrix} \times \frac{1}{8}$$

$$\to \begin{bmatrix} 0.4 & 1 & 2 & 0 & 1 & 0 \\ 0 & -0.2 & 0.75 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{8} \end{bmatrix} \to \begin{bmatrix} \frac{2}{5} & 1 & 2 & 0 & 1 & 0 \\ 0 & \frac{1}{5} & \frac{3}{4} & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{8} \end{bmatrix} \begin{matrix} -① \\ -② \\ -③ \end{matrix} \quad ② - ③\times\frac{3}{4}$$

$$\to \begin{bmatrix} \frac{2}{5} & 1 & 2 & 0 & 1 & 0 \\ 0 & \frac{1}{5} & 0 & 1 & 0 & -\frac{3}{32} \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{8} \end{bmatrix} \begin{matrix} -④ \\ -⑤ \\ -⑥ \end{matrix} \quad \begin{matrix} (④ - ⑤\times 5 - ⑥\times 2)\times\frac{5}{2} \\ (⑤\times 5) \end{matrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & +12.5 & 2.5 & -\frac{115}{64} \\ 0 & 1 & 0 & 5 & 0 & +\frac{15}{32} \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{8} \end{bmatrix}$$

$\frac{3}{3}$ 역행렬은 $\begin{bmatrix} +12.5 & 2.5 & -\frac{115}{64} \\ 5 & 0 & +\frac{15}{32} \\ 0 & 0 & \frac{1}{8} \end{bmatrix}$

Cramer 공식

$$\begin{bmatrix} 0 & -0.2 & 0.75 \\ 0.4 & 1 & 2 \\ 0 & 0 & 8 \end{bmatrix} \quad \det A = 0.2 \begin{vmatrix} 0.4 & 2 \\ 0 & 8 \end{vmatrix} + 0.75 \begin{vmatrix} 0.4 & 1 \\ 0 & 0 \end{vmatrix} = 0.64$$

$$x_1 = \frac{1}{\det A} \begin{vmatrix} 1 & -0.2 & 0.75 \\ 0 & 1 & 2 \\ 0 & 0 & 8 \end{vmatrix}^T = \frac{8}{0.64} = 12.5$$

$$x_2 = \frac{1}{\det A} \begin{bmatrix} 0 & 0 & 0.75 \\ 0.4 & 1 & 2 \\ 0 & 0 & 8 \end{bmatrix}^T = \frac{0}{0.64} = 0$$

$$x_3 = \frac{1}{\det A} \begin{bmatrix} 0 & -0.2 & 0 \\ 0.4 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}^T = \frac{0.08}{0.64} = 0.125$$

$$x_4 = \frac{1}{\det A} \begin{bmatrix} 0 & 1 & 0.75 \\ 0.4 & 0 & 2 \\ 0 & 0 & 8 \end{bmatrix}^T = \frac{3.2}{0.64} = 5$$

$$x_5 = \frac{1}{\det A} \begin{bmatrix} 0 & -0.2 & 1 \\ 0.4 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}^T = 0$$

$$x_6 = \frac{1}{\det A} \begin{bmatrix} 0 & -0.2 & 0.75 \\ 1 & 1 & 2 \\ 0 & 0 & 8 \end{bmatrix}^T = \frac{1.6}{0.64} = 2.5$$

$$x_7 = \frac{1}{\det A} \begin{bmatrix} 0 & -0.2 & 0.75 \\ 0 & 1 & 2 \\ 1 & 0 & 8 \end{bmatrix}^T = \frac{-(0.2 \cdot 2 + 0.75)}{0.64} = -\frac{115}{64}$$

$$x_8 = \frac{1}{\det A} \begin{bmatrix} 0 & 0 & 0.75 \\ 0.4 & 0 & 2 \\ 0 & 1 & 8 \end{bmatrix}^T = \frac{0.3}{0.64} = \frac{15}{32}$$

$$x_9 = \frac{1}{\det A} \begin{bmatrix} 0 & -0.2 & 0 \\ 0.4 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}^T = 0$$

$$\begin{bmatrix} 12.5 & 2.5 & -\frac{115}{64} \\ 5 & 0 & \frac{15}{32} \\ 0 & 0 & \frac{1}{8} \end{bmatrix} \cdots \text{역행렬}$$

-> 가우조단 소거법을 통해 얻은 역행렬과 같은 값을 확인할 수 있다.