

$$1.15 \quad D = (AB)' - C^2$$

$$A = \begin{pmatrix} 5 & 42 \\ 10 & 5 \end{pmatrix}$$

$$B = \begin{pmatrix} 2 & 8 \\ 1 & 5 \end{pmatrix}$$

$$C = \begin{pmatrix} 13 \\ 0 \\ 4 \end{pmatrix}$$

$$AB = \begin{pmatrix} 5+4 & 42+5 \\ 10 & 25 \end{pmatrix} \cdot \begin{pmatrix} 2 & 8 \\ 1 & 5 \end{pmatrix} \Rightarrow \begin{pmatrix} 10 & 22 \\ 2 & 25 \end{pmatrix}$$

$$(AB)^T \Rightarrow \begin{pmatrix} 10 & 2 \\ 2 & 25 \end{pmatrix}$$

$$C \times C = \begin{pmatrix} 1 & 3 \\ 0 & 4 \end{pmatrix} \times \begin{pmatrix} 1 & 3 \\ 0 & 4 \end{pmatrix} = \begin{pmatrix} 1 & 15 \\ 0 & 16 \end{pmatrix}$$

$$D = \begin{pmatrix} 1 & 3 \\ 2 & 9 \end{pmatrix}$$

A

$$1.16 \quad ABC?$$

$$A = \begin{pmatrix} 4 & 3 \\ 7 & 5 \end{pmatrix} \quad B = \begin{pmatrix} -28 & 82 \\ 32 & -126 \end{pmatrix}$$

$$AB = \begin{pmatrix} -4 \cdot 28 + 3 \cdot 32 & 4 \cdot 82 + 3 \cdot (-126) \\ -7 \cdot 28 + 5 \cdot 32 & 7 \cdot 82 - 126 \cdot 5 \end{pmatrix} = \begin{pmatrix} 2 & -6 \\ -6 & 24 \end{pmatrix} \quad C = \begin{pmatrix} 7 & 3 \\ 2 & 1 \end{pmatrix}$$

$$ABC = \begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$$

A

1.19 det?

$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & -3 & 1 \\ 4 & -1 & -5 \end{vmatrix} = 15 + 4 + (-2) + 12 + 10 + 2 = 40 \quad (\oplus)$$

1.22 $A = \begin{pmatrix} 4 & -8 & -5 \\ -4 & 7 & -1 \\ -3 & 5 & 1 \end{pmatrix}$ $A^{-1} ?$

$\det A = 68 + 100 + (-24) - 105 + 20 - 32 = -13$

$$A^T = \begin{pmatrix} 4 & -4 & -3 \\ -8 & 7 & 5 \\ -5 & 2 & 1 \end{pmatrix} \quad A_{ij} = (-1)^{i+j} N_{ij}$$

$$\tilde{A} = \begin{pmatrix} 12 & -17 & 43 \\ +7 & -18 & +24 \\ -13 & 14 & -4 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} \frac{12}{13} & \frac{17}{13} & -\frac{43}{13} \\ \frac{7}{13} & \frac{18}{13} & -\frac{24}{13} \\ -\frac{13}{13} & \frac{14}{13} & \frac{4}{13} \end{pmatrix} \quad (\oplus)$$

2.25

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

$$\begin{matrix} \cancel{\begin{pmatrix} 2 & 5 & 6 \\ 4 & -1 & 5 \\ 2 & -6 & -1 \end{pmatrix}} \\ + (-2) \\ + (-1) \end{matrix} \Rightarrow \begin{pmatrix} 2 & 5 & 6 \\ 0 & -10 & -9 \\ 0 & -11 & 7 \end{pmatrix}$$

$$\times (-1) \quad \begin{pmatrix} 2 & 5 & 6 \\ 0 & -10 & -9 \\ 0 & 0 & 20 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 5 & 6 \\ 0 & -10 & -9 \\ 0 & -10 & -9 \end{pmatrix} \xrightarrow{\left\{ \begin{array}{l} \times (-2) \\ + \\ + (-1) \end{array} \right.} \begin{pmatrix} 2 & 5 & 6 \\ 0 & -10 & -9 \\ 0 & 0 & 0 \end{pmatrix} \quad | = 2$$

$$\begin{pmatrix} 2 & 0 & 3 & 5 & 1 \\ 4 & 3 & -1 & 7 & -5 \\ 0 & -5 & -2 & 3 & 4 \end{pmatrix} \xrightarrow{\left\{ \begin{array}{l} \times -2 \\ \times 2 \end{array} \right.} \begin{pmatrix} 2 & 0 & 3 & 5 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 0 & 3 & 5 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \quad | = 2$$

Opportunities Matrix:

$$\det A \neq 0 \Rightarrow x = A^{-1}B$$

$$2.55 \quad \begin{cases} x_1 + 2x_2 + 3x_3 = 6 \\ 2x_1 + 3x_2 - 4x_3 = 4 \\ 3x_1 + x_2 - 4x_3 = 0 \end{cases}$$

Metodos
de
eliminación

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 6 \\ 2 & 3 & -4 & 4 \\ 3 & 1 & -4 & 0 \end{array} \right) \xrightarrow{x-2} \left(\begin{array}{ccc|c} 1 & 2 & 3 & 6 \\ 0 & -1 & -10 & -8 \\ 0 & -5 & -7 & 0 \end{array} \right) \xrightarrow{x-3} \left(\begin{array}{ccc|c} 1 & 2 & 3 & 6 \\ 0 & 1 & 7 & 8 \\ 0 & 0 & -13 & -58 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 6 \\ 0 & 1 & 7 & 8 \\ 0 & 0 & -13 & -58 \end{array} \right) \xrightarrow{\text{?}}$$

$$\begin{aligned} x_1 + 2x_2 + 3x_3 &= 6 \\ -x_2 - 7x_3 &= -8 \\ 22x_3 &= 22 \end{aligned}$$

$$x_3 = 1 \quad \Rightarrow \quad x_2 = 8 - 7 = 1$$

$$x_1 = 6 - 2 - 3 = 1$$

$$x = (1, 1, 1)$$

⊕

$$2.21 \quad \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix} X = \begin{pmatrix} 1 & 0 & 7 \\ 8 & 1 & 2 \end{pmatrix}$$

\downarrow
 A

\downarrow
 X

\downarrow
 B

$$AX = B$$

$$\det A = \begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} = 2 - 1 = 1 \Rightarrow X = A^{-1}B$$

$$A^{-1} = \begin{pmatrix} 0 & -1 \\ -1 & 1 \end{pmatrix} \quad \tilde{A} = \begin{pmatrix} 1 & -1 & 1 \\ -1 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix} \quad \leftarrow$$

$$A^{-1} = \frac{1}{\det A} \quad \tilde{A} = \begin{pmatrix} 1 & -1 & 1 \\ -1 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix}$$

$$X = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 7 \\ 8 & 1 & 2 \end{pmatrix} = \begin{pmatrix} -7 & -1 & 5 \\ 15 & 2 & -3 \end{pmatrix}$$

2x2 2x3

$$2.24 \quad \begin{cases} x_1 + 2x_2 - x_3 = 5 \\ 2x_1 - x_2 - 3x_3 = -4 \end{cases}$$

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$$\left(\begin{array}{ccc|c} 1 & 2 & -1 & 5 \\ 2 & -1 & -3 & -4 \end{array} \right) \xrightarrow{-2} \left(\begin{array}{ccc|c} 1 & 2 & -1 & 5 \\ 0 & -5 & -1 & -14 \end{array} \right)$$

$$C_3 = \frac{(-5)^0}{0!} = 1 \quad C_2 = \frac{(-5)^1}{1!} = -5 \quad C_1 = \frac{(-5)^2}{2!} = 25$$

$$(x_1 x_2) \quad (x_1 x_3) \quad \cancel{(x_1 x_4)} \quad (x_2 x_3)$$

$$\cancel{(x_2 x_4)} \quad \cancel{(x_3 x_4)}$$

$$\frac{x_1 x_2}{x_1 x_3} : \begin{vmatrix} 1 & 2 \\ 0 & 5 \end{vmatrix} = -5 - 2 = -7$$

$$\frac{x_1 x_3}{x_1 x_4} : \begin{vmatrix} 1 & 2 \\ 0 & -1 \end{vmatrix} = -2 \quad \frac{x_2 x_3}{x_2 x_4} : \begin{vmatrix} 2 & -1 \\ -5 & 1 \end{vmatrix} = 3$$

$$\frac{x_1 x_4}{x_2 x_3} : \begin{vmatrix} 1 & 2 \\ 0 & -14 \end{vmatrix} = -14 \quad \frac{x_2 x_4}{x_3 x_4} : \begin{vmatrix} 2 & 5 \\ -5 & -14 \end{vmatrix} = -3$$

$$\cancel{x_3 x_4} : \begin{vmatrix} 1 & 5 \\ -1 & 14 \end{vmatrix} = 28$$

$$(x_1 x_2) : \begin{cases} x_1 + 2x_2 = 5 \\ 2x_1 - x_2 = -4 \end{cases} \Rightarrow x_2 = -\frac{3}{5} \quad x_1 = \frac{28}{5}$$

$$x_1 x_3 : \begin{cases} x_1 - x_3 = 5 \\ 2x_1 - 3x_3 = -4 \end{cases} \quad x_1 = 18 \quad x_3 = -14 \quad \cancel{x_1 x_3} : \begin{vmatrix} 1 & -1 \\ 2 & -3 \end{vmatrix} = 14$$

$$x_2 x_3 : \begin{cases} 2x_2 - x_3 = 5 \\ -x_2 + 3x_3 = -4 \end{cases} \quad x_2 = 0 \quad x_3 = \frac{5}{2} \quad \cancel{x_2 x_3} : \begin{vmatrix} 2 & -1 \\ -1 & 3 \end{vmatrix} = \frac{5}{2}$$