

$$(5.1) \quad 1) \quad A = (1, 2, 3) \quad B = \begin{pmatrix} 4 \\ 5 \\ 6 \end{pmatrix}$$

$$\underline{A \cdot 2} = (2, 4, 6) \quad \underline{B \cdot A} = \begin{pmatrix} 4 & 5 & 6 \\ 8 & 10 & 12 \\ 12 & 15 & 18 \end{pmatrix}$$

$$\underline{A \cdot B} = 1 \cdot 4 + 2 \cdot 5 + 3 \cdot 6 = 32$$

$$2) \quad (5 \cdot E)^{-1} = \left(5 \cdot \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \right)^{-1} =$$

$$= \begin{pmatrix} 5 & 0 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{pmatrix}^{-1} = \begin{pmatrix} \underline{0.2} & 0 & 0 & 0 & 0 \\ 0 & \underline{0.2} & 0 & 0 & 0 \\ 0 & 0 & \underline{0.2} & 0 & 0 \\ 0 & 0 & 0 & \underline{0.2} & 0 \\ 0 & 0 & 0 & 0 & \underline{0.2} \end{pmatrix}$$

$$(5.2) \quad \begin{vmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 1 \cdot \begin{vmatrix} 0 & 6 \\ 8 & 9 \end{vmatrix} - 2 \cdot \begin{vmatrix} 4 & 6 \\ 7 & 9 \end{vmatrix} + 3 \cdot \begin{vmatrix} 4 & 0 \\ 7 & 8 \end{vmatrix} =$$

$$= -48 + 12 + 96 = \underline{60}$$

$$(5.3) 1) A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 7 & 8 & 9 \end{pmatrix} \quad A^{-1} = \frac{A^*}{\det A} \quad \det A = 60$$

$$M = \begin{pmatrix} -48 & 6 & 32 \\ -6 & -12 & -6 \\ 12 & 6 & -8 \end{pmatrix} \quad A^* = \begin{pmatrix} -48 & 6 & 32 \\ 6 & -12 & 6 \\ 12 & 6 & -8 \end{pmatrix} \quad A^*^T = \begin{pmatrix} -48 & 6 & 12 \\ 6 & -12 & 6 \\ 32 & 6 & -8 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} -48 & 6 & 12 \\ 6 & -12 & 6 \\ 32 & 6 & -8 \end{pmatrix} / 60 = \begin{pmatrix} -\frac{4}{5} & \frac{1}{10} & \frac{1}{5} \\ \frac{1}{10} & -\frac{1}{5} & \frac{1}{10} \\ \frac{8}{15} & \frac{1}{10} & -\frac{2}{15} \end{pmatrix}$$

$$2) \begin{pmatrix} 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \end{pmatrix} \text{ with } \begin{pmatrix} 3 & 3 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 3 & 3 & 3 & 3 \\ 2 & 2 & 2 & 2 \end{pmatrix}$$

$$(5.4) \quad A = (1, 5) \quad B = (2, 8)$$

$$A \cdot B = 2 + 40 = 42$$

$$(5.5) \quad a = (1, 5, 0), \quad b = (2, 8, 7), \quad c = (7, 1.5, 3)$$

$$\begin{aligned} \underline{a \cdot (b \times c)} &= \begin{vmatrix} 1 & 5 & 0 \\ 2 & 8 & 7 \\ 7 & 1.5 & 3 \end{vmatrix} = 1 \cdot 13.5 - 5 \cdot (-43) + 0 = \\ &= 13.5 + 215 = \underline{228.5} \end{aligned}$$

$$6. \textcircled{1} \begin{pmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 7 & 8 & 9 \end{pmatrix} \cdot X = \begin{pmatrix} 12 \\ 2 \\ 1 \end{pmatrix} = B$$

$$X = A^{-1} \cdot B$$

wg $\textcircled{5.3.1}$

$$A^{-1} = \begin{pmatrix} -\frac{4}{5} & \frac{1}{10} & \frac{1}{5} \\ \frac{1}{10} & \frac{1}{5} & \frac{1}{10} \\ \frac{8}{15} & \frac{1}{10} & \frac{2}{15} \end{pmatrix}$$

$$X = \begin{pmatrix} -\frac{4}{5} & \frac{1}{10} & \frac{1}{5} \\ \frac{1}{10} & \frac{1}{5} & \frac{1}{10} \\ \frac{8}{15} & \frac{1}{10} & \frac{2}{15} \end{pmatrix} \cdot \begin{pmatrix} 12 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} -\frac{48}{5} + \frac{2}{10} + \frac{1}{5} \\ \frac{12}{10} - \frac{2}{5} + \frac{1}{10} \\ \frac{96}{15} + \frac{2}{10} - \frac{2}{15} \end{pmatrix} = \begin{pmatrix} -\frac{46}{5} \\ \frac{9}{10} \\ \frac{194}{30} \end{pmatrix}$$

$$\underline{X = \begin{pmatrix} -9,2 \\ 0,9 \\ 6,4666 \end{pmatrix}}$$

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$\textcircled{3}$ ul. lesson-07.ipynb

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