

1] 次の式を計算せよ (各 1 点):

$$(1) 3 \begin{pmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 1 \end{pmatrix} - 4 \begin{pmatrix} 0 & 3 \\ 3 & 0 \\ 1 & 2 \end{pmatrix} + 5 \begin{pmatrix} 1 & 0 \\ -1 & 1 \\ -1 & 0 \end{pmatrix} = \begin{pmatrix} 3 & 6 \\ 6 & 3 \\ 3 & 3 \end{pmatrix} - \begin{pmatrix} 0 & 12 \\ 12 & 0 \\ 4 & 8 \end{pmatrix} + \begin{pmatrix} 5 & 0 \\ -5 & 5 \\ -5 & 0 \end{pmatrix} = \begin{pmatrix} 8 & -6 \\ -11 & 8 \\ -6 & -5 \end{pmatrix}$$

$$(2) A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}, B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, C = \begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} \text{ のとき,}$$

$$\begin{aligned} (-3A + 5B - C) - 2(-2A + 2B - C) &= A + B + C \\ &= \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} + \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} + \begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} \\ &= \begin{pmatrix} 2 & 5 \\ 3 & 4 \end{pmatrix} \end{aligned}$$

2] $a_{ij} = i - 2j$, ($1 \leq i \leq 2, 1 \leq j \leq 3$) を (i, j) 成分にもつ 2×3 行列 $A = (a_{ij})$ を書け. (1 点)

$$\begin{aligned} A &= \begin{pmatrix} 1 - 2 \times 1 & 1 - 2 \times 2 & 1 - 2 \times 3 \\ 2 - 2 \times 1 & 2 - 2 \times 2 & 2 - 2 \times 3 \end{pmatrix} \\ &= \begin{pmatrix} -1 & -3 & -5 \\ 0 & -2 & -4 \end{pmatrix} \end{aligned}$$

3] 次の行列の積を計算せよ. ただし, 積が定義されないときは「定義されない」と答えよ (各 1 点):

(1)

$$\begin{aligned} \begin{pmatrix} 1 & 0 \\ 2 & 1 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 0 & 2 & 1 \\ 1 & -3 & 2 \end{pmatrix} &= \begin{pmatrix} 1 \times 0 + 0 \times 1 & 1 \times 2 + 0 \times (-3) & 1 \times 1 + 0 \times 2 \\ 2 \times 0 + 1 \times 1 & 2 \times 2 + 1 \times (-3) & 2 \times 1 + 1 \times 2 \\ -1 \times 0 + 1 \times 1 & -1 \times 2 + 1 \times (-3) & -1 \times 1 + 1 \times 2 \end{pmatrix} \\ &= \begin{pmatrix} 0 & 2 & 1 \\ 1 & 1 & 4 \\ 1 & -5 & 1 \end{pmatrix} \end{aligned}$$

(2)

$$\begin{aligned} (0 \ 1 \ 2) \begin{pmatrix} 1 & 2 \\ 3 & -1 \\ 1 & 0 \end{pmatrix} &= (0 \times 1 + 1 \times 3 + 2 \times 1 \quad 0 \times 2 + 1 \times (-1) + 2 \times 0) \\ &= (5 \quad -1) \end{aligned}$$

$$(3) \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} \begin{pmatrix} -2 & 3 & 1 \\ 0 & 3 & 4 \end{pmatrix}: \text{定義されない}$$