

線形代数 A 演習問題 No.2
解答

学生番号

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1. 次の行列の積を計算せよ.

$$(1) \begin{pmatrix} 2 & -1 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} 2 & 4 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 2 \times 2 + (-1) \times (-1) & 2 \times 4 + (-1) \times 1 \\ 3 \times 2 + 5 \times (-1) & 3 \times 4 + 5 \times 1 \end{pmatrix} \\ = \begin{pmatrix} 5 & 7 \\ 1 & 17 \end{pmatrix}$$

$$(2) (1 \ 2) \begin{pmatrix} 3 \\ 4 \end{pmatrix} = (1 \times 3 + 2 \times 4) = (11)$$

$$(3) \begin{pmatrix} 1 & 2 \\ 4 & 3 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 4 & 1 & 1 \\ 2 & 5 & 3 \end{pmatrix} = \begin{pmatrix} 1 \times 4 + 2 \times 2 & 1 \times 1 + 2 \times 5 & 1 \times 1 + 2 \times 3 \\ 4 \times 4 + 3 \times 2 & 4 \times 1 + 3 \times 5 & 4 \times 1 + 3 \times 3 \\ 3 \times 4 + 1 \times 2 & 3 \times 1 + 1 \times 5 & 3 \times 1 + 1 \times 3 \end{pmatrix} \\ = \begin{pmatrix} 8 & 11 & 7 \\ 22 & 19 & 13 \\ 14 & 8 & 6 \end{pmatrix}$$

$$(4) \begin{pmatrix} 4 & 1 & 1 \\ 2 & 5 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 4 & 3 \\ 3 & 1 \end{pmatrix} = \begin{pmatrix} 4 \times 1 + 1 \times 4 + 1 \times 3 & 4 \times 2 + 1 \times 3 + 1 \times 1 \\ 2 \times 1 + 5 \times 4 + 3 \times 3 & 2 \times 2 + 5 \times 3 + 3 \times 1 \end{pmatrix} \\ = \begin{pmatrix} 11 & 12 \\ 31 & 22 \end{pmatrix}$$

2. 次の行列の積を計算せよ.

$$(1) \begin{pmatrix} 1 & 0 & 3 \\ 2 & -1 & 4 \\ 0 & -2 & -5 \end{pmatrix} \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix} \\ = \begin{pmatrix} 1 \times 1 + 0 \times 2 + 3 \times 3 & 1 \times 4 + 0 \times 5 + 3 \times 6 & 1 \times 7 + 0 \times 8 + 3 \times 9 \\ 2 \times 1 + (-1) \times 2 + 4 \times 3 & 2 \times 4 + (-1) \times 5 + 4 \times 6 & 2 \times 7 + (-1) \times 8 + 4 \times 9 \\ 0 \times 1 + (-2) \times 2 + (-5) \times 3 & 0 \times 4 + (-2) \times 5 + (-5) \times 6 & 0 \times 7 + (-2) \times 8 + (-5) \times 9 \end{pmatrix} \\ = \begin{pmatrix} 10 & 22 & 34 \\ 12 & 27 & 42 \\ -19 & -40 & -61 \end{pmatrix}$$

$$\begin{aligned}
(2) & \begin{pmatrix} 1 & 3 \\ 2 & 1 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 1 & 3 & 2 \\ 0 & 1 & 5 \end{pmatrix} \\
&= \begin{pmatrix} 1 \times 1 + 3 \times 0 & 1 \times 3 + 3 \times 1 & 1 \times 2 + 3 \times 5 \\ 2 \times 1 + 1 \times 0 & 2 \times 3 + 1 \times 1 & 2 \times 2 + 1 \times 5 \\ -1 \times 1 + 3 \times 0 & -1 \times 3 + 3 \times 1 & -1 \times 2 + 3 \times 5 \end{pmatrix} \\
&= \begin{pmatrix} 1 & 6 & 17 \\ 2 & 7 & 9 \\ -1 & 0 & 13 \end{pmatrix}
\end{aligned}$$

3. $A = \begin{pmatrix} 2 & 6 \\ 1 & 3 \end{pmatrix}, B = \begin{pmatrix} 3 & -3 \\ -1 & 1 \end{pmatrix}$ のとき, 次の行列の積を計算せよ.

$$(1) AB = \begin{pmatrix} 2 & 6 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 3 & -3 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 2 \times 3 + 6 \times (-1) & 2 \times (-3) + 6 \times 1 \\ 1 \times 3 + 3 \times (-1) & 1 \times (-3) + 3 \times 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$(2) BA = \begin{pmatrix} 3 & -3 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 2 & 6 \\ 1 & 3 \end{pmatrix} = \begin{pmatrix} 3 \times 2 + (-3) \times 1 & 3 \times 6 + (-3) \times 3 \\ (-1) \times 2 + 1 \times 1 & (-1) \times 6 + 1 \times 3 \end{pmatrix} = \begin{pmatrix} 3 & 9 \\ -1 & -3 \end{pmatrix}$$