

線形代数の演習Ⅱ 宿題70111 No.1 解答 No. (9.23)

1

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

$$A^3 = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$A^4 = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \quad \text{アイ}$$

$$n = 4k+1 \text{ のとき } A^n = A = \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$n = 4k+2 \text{ のとき } A^n = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$n = 4k+3 \text{ のとき } A^n = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$n = 4k \text{ のとき } A^n = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I \text{ (単位行列)}$$

(k : 自然数)

2.

$$BA = \begin{pmatrix} 2 & -1 \\ -2 & 0 \\ 1 & 0 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} -1 & 1 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} -4 & 3 \\ 2 & -2 \\ -1 & 1 \\ -3 & 2 \end{pmatrix}$$

$$CB = (-2 \ 3 \ -3 \ 2) \begin{pmatrix} 2 & -1 \\ -2 & 0 \\ 1 & 0 \\ 1 & -1 \end{pmatrix} = (-4-6-3+2 \quad 2-2) \\ = (-11, 0)$$

$$\left(\begin{array}{l} A: 2 \times 2 \quad B: 4 \times 2, \quad C: 1 \times 4 \text{ なのて} \\ BA, CB \text{ (かたまり)} \end{array} \right)$$