



線形代数Ⅱの演習Ⅱ. 宿題 2011 年 NO.4 解答. (10.14)

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$$A_2 = (a_1, a_2) = \begin{pmatrix} 1 & 4 \\ 1 & 3 \\ 2 & 8 \\ 2 & 7 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 \\ 0 & -1 \\ 0 & 0 \\ 0 & -1 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 \\ 0 & -1 \\ 0 & 0 \\ 0 & 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 \\ 0 & -1 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$\text{rank}(A_2) = 2 = (\text{1°の個数})$ より 1次独立

$$A_3 = (a_1, a_2, a_3) = \begin{pmatrix} 1 & 4 & 0 \\ 1 & 3 & 1 \\ 2 & 8 & 0 \\ 2 & 7 & 1 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & 0 \\ 0 & -1 & 1 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 1 & 0 & 4 \\ 0 & -1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$\text{rank}(A_3) = 2 < 3 = (\text{1°の個数})$ より 1次従属

$$A_4 = (a_1, a_2, a_4) = \begin{pmatrix} 1 & 4 & 4 \\ 1 & 3 & 2 \\ 2 & 8 & 9 \\ 2 & 7 & 6 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 4 \\ 0 & -1 & -2 \\ 0 & 0 & 1 \\ 0 & -1 & -2 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 4 \\ 0 & -1 & -2 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

$\text{rank}(A_4) = 3$ より 1次独立

$$A_5 = (a_1, a_2, a_4, a_5) = \begin{pmatrix} 1 & 4 & 4 & 1 \\ 1 & 3 & 2 & 1 \\ 2 & 8 & 9 & 3 \\ 2 & 7 & 6 & 2 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 4 & 1 \\ 0 & -1 & -2 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & -1 & -2 & 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 4 & 4 & 1 \\ 0 & -1 & -2 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 1 & 4 & 0 & -3 \\ 0 & -1 & 0 & -2 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & 0 & 5 \\ 0 & -1 & 0 & -2 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$\text{rank}(A_5) = 3 < 4 = (\text{1°の個数})$

より 1次従属