

代幾 I 計算演習 [問題] (2008/12/18)

問. 次の行列 A によって定まる線型変換 T_A の基底 E, F に関する行列を求めなさい。

Q.1

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

$$E = \left\langle \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 0 \\ -2 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 3 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix} \right\rangle$$

Q.4

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

$$E = \left\langle \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 2 \\ 2 \\ -1 \end{pmatrix}, \begin{pmatrix} -2 \\ -1 \\ 1 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}, \begin{pmatrix} -5 \\ 2 \\ -4 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} \right\rangle$$

Q.2

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

$$E = \left\langle \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} -1 \\ -1 \\ -1 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 0 \\ 2 \\ -1 \end{pmatrix}, \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} -1 \\ -3 \\ 3 \end{pmatrix} \right\rangle$$

Q.5

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

$$E = \left\langle \begin{pmatrix} -5 \\ 7 \\ -5 \end{pmatrix}, \begin{pmatrix} 3 \\ -4 \\ 3 \end{pmatrix}, \begin{pmatrix} -1 \\ 2 \\ -2 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}, \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \right\rangle$$

Q.3

$$A = \begin{pmatrix} -1 & 2 & 1 \\ -3 & 3 & 1 \\ 2 & -3 & -1 \end{pmatrix}$$

$$E = \left\langle \begin{pmatrix} 0 \\ 2 \\ -5 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}, \begin{pmatrix} -2 \\ -1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} \right\rangle$$

Q.6

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

$$E = \left\langle \begin{pmatrix} 1 \\ -1 \\ -3 \end{pmatrix}, \begin{pmatrix} 1 \\ -2 \\ -3 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\rangle$$

$$F = \left\langle \begin{pmatrix} 0 \\ 4 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \right\rangle$$

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A.1

$$\begin{pmatrix} -5 & 4 & -2 \\ 2 & -2 & 1 \\ 15 & -13 & 7 \end{pmatrix}$$

A.2

$$\begin{pmatrix} 10 & -3 & -2 \\ -5 & 3 & 0 \\ 6 & -2 & -1 \end{pmatrix}$$

A.3

$$\begin{pmatrix} 3 & -1 & -8 \\ -1 & 0 & 5 \\ -6 & 2 & 15 \end{pmatrix}$$

A.4

$$\begin{pmatrix} -2 & 0 & -1 \\ -1 & 2 & -1 \\ 1 & 7 & -1 \end{pmatrix}$$

A.5

$$\begin{pmatrix} -9 & 5 & -3 \\ 22 & -13 & 7 \\ 10 & -6 & 3 \end{pmatrix}$$

A.6

$$\begin{pmatrix} -8 & -9 & 1 \\ -7 & -9 & 1 \\ 38 & 44 & -5 \end{pmatrix}$$