

代数学幾何学 (A/B) 計算演習 [問題] (2009/12/24)

問. 線型空間 ($\{a \cos \theta + b \sin \theta \mid a, b \in \mathbf{R}\}$) の、次の二組の基底 E, F に対して、 E から F への基底の変換行列を求めなさい。

Q.1

$$\begin{aligned} E &= \langle \cos \theta + \sin \theta, 2 \cos \theta + \sin \theta \rangle \\ F &= \langle -5 \cos \theta - 3 \sin \theta, 3 \cos \theta + 2 \sin \theta \rangle \end{aligned}$$

Q.9

$$\begin{aligned} E &= \langle \cos \theta + \sin \theta, \cos \theta \rangle \\ F &= \langle \cos \theta - 2 \sin \theta, \cos \theta - 3 \sin \theta \rangle \end{aligned}$$

Q.2

$$\begin{aligned} E &= \langle \sin \theta, -\cos \theta + 2 \sin \theta \rangle \\ F &= \langle -\cos \theta + 2 \sin \theta, 3 \cos \theta - 7 \sin \theta \rangle \end{aligned}$$

Q.10

$$\begin{aligned} E &= \langle -\cos \theta, -\cos \theta + \sin \theta \rangle \\ F &= \langle -2 \cos \theta + 3 \sin \theta, -\cos \theta + \sin \theta \rangle \end{aligned}$$

Q.3

$$\begin{aligned} E &= \langle \cos \theta, -\cos \theta - \sin \theta \rangle \\ F &= \langle \cos \theta + \sin \theta, -\cos \theta \rangle \end{aligned}$$

Q.11

$$\begin{aligned} E &= \langle -\cos \theta + 2 \sin \theta, \cos \theta - \sin \theta \rangle \\ F &= \langle -2 \cos \theta + 3 \sin \theta, \cos \theta - \sin \theta \rangle \end{aligned}$$

Q.4

$$\begin{aligned} E &= \langle -\cos \theta, \sin \theta \rangle \\ F &= \langle -\cos \theta - \sin \theta, -\sin \theta \rangle \end{aligned}$$

Q.12

$$\begin{aligned} E &= \langle \cos \theta, \sin \theta \rangle \\ F &= \langle \sin \theta, \cos \theta + 2 \sin \theta \rangle \end{aligned}$$

Q.5

$$\begin{aligned} E &= \langle \cos \theta, -\sin \theta \rangle \\ F &= \langle \cos \theta, \sin \theta \rangle \end{aligned}$$

Q.13

$$\begin{aligned} E &= \langle 2 \cos \theta + \sin \theta, \cos \theta + \sin \theta \rangle \\ F &= \langle -2 \cos \theta - \sin \theta, -5 \cos \theta - 3 \sin \theta \rangle \end{aligned}$$

Q.6

$$\begin{aligned} E &= \langle \cos \theta, -\cos \theta - \sin \theta \rangle \\ F &= \langle -\cos \theta - \sin \theta, -\cos \theta \rangle \end{aligned}$$

Q.14

$$\begin{aligned} E &= \langle \cos \theta, -3 \cos \theta - \sin \theta \rangle \\ F &= \langle 3 \cos \theta + \sin \theta, -2 \cos \theta - \sin \theta \rangle \end{aligned}$$

Q.7

$$\begin{aligned} E &= \langle \cos \theta, 2 \cos \theta - \sin \theta \rangle \\ F &= \langle -\cos \theta + \sin \theta, 3 \cos \theta - 2 \sin \theta \rangle \end{aligned}$$

Q.15

$$\begin{aligned} E &= \langle -\cos \theta + \sin \theta, \cos \theta \rangle \\ F &= \langle -\sin \theta, -\cos \theta \rangle \end{aligned}$$

Q.8

$$\begin{aligned} E &= \langle -\cos \theta + \sin \theta, 2 \cos \theta - \sin \theta \rangle \\ F &= \langle -\cos \theta + \sin \theta, 3 \cos \theta - 2 \sin \theta \rangle \end{aligned}$$

Q.16

$$\begin{aligned} E &= \langle \sin \theta, \cos \theta \rangle \\ F &= \langle \cos \theta, \sin \theta \rangle \end{aligned}$$

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A.1

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

A.9

$$\begin{pmatrix} -2 & -3 \\ 3 & 4 \end{pmatrix}$$

A.2

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

A.10

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

A.3

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

A.11

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

A.4

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

A.12

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

A.5

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

A.13

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

A.6

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

A.14

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

A.7

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

A.15

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

A.8

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

A.16

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